FRIALIT®-2
Manual

The System

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FRIALIT®-2 Manual

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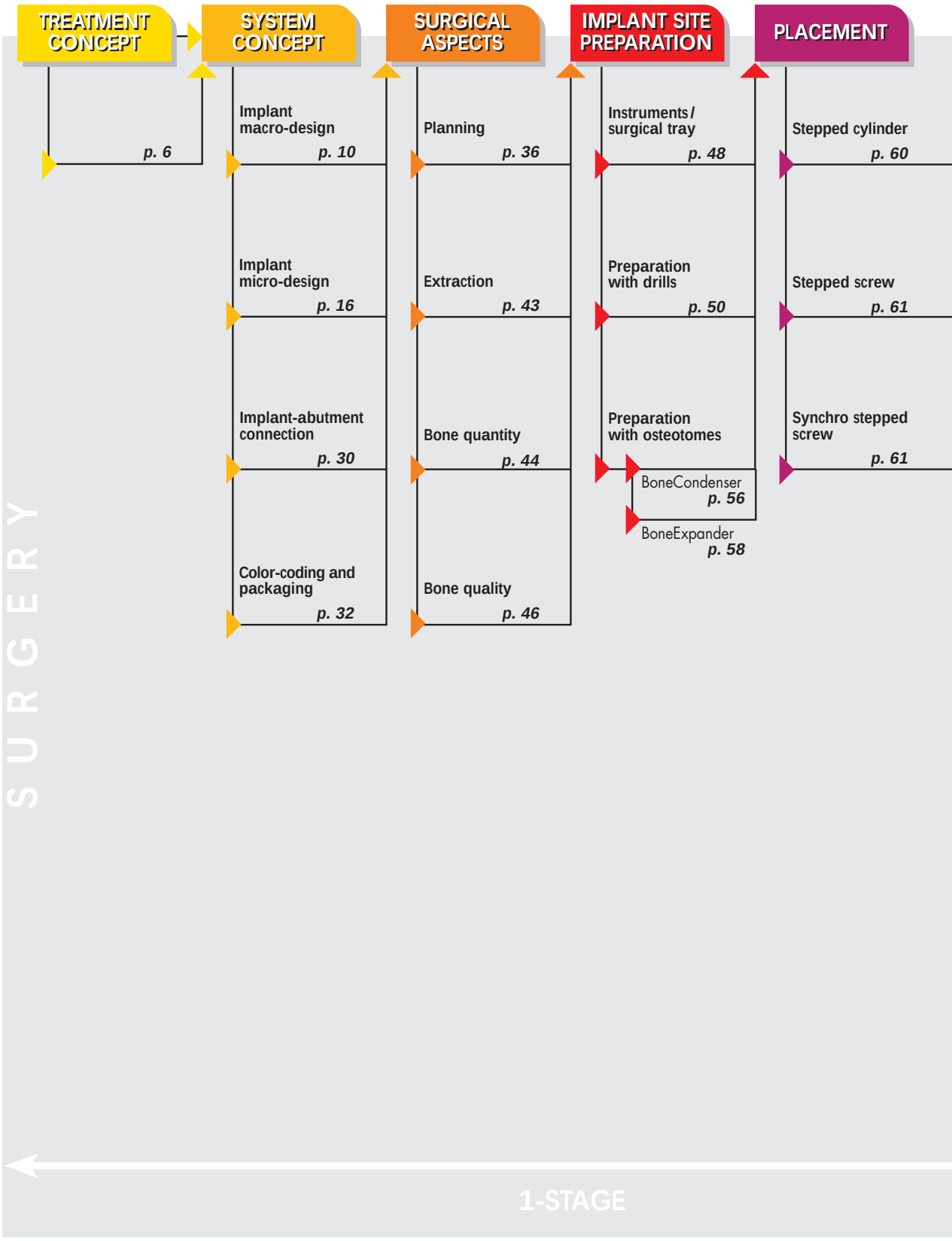
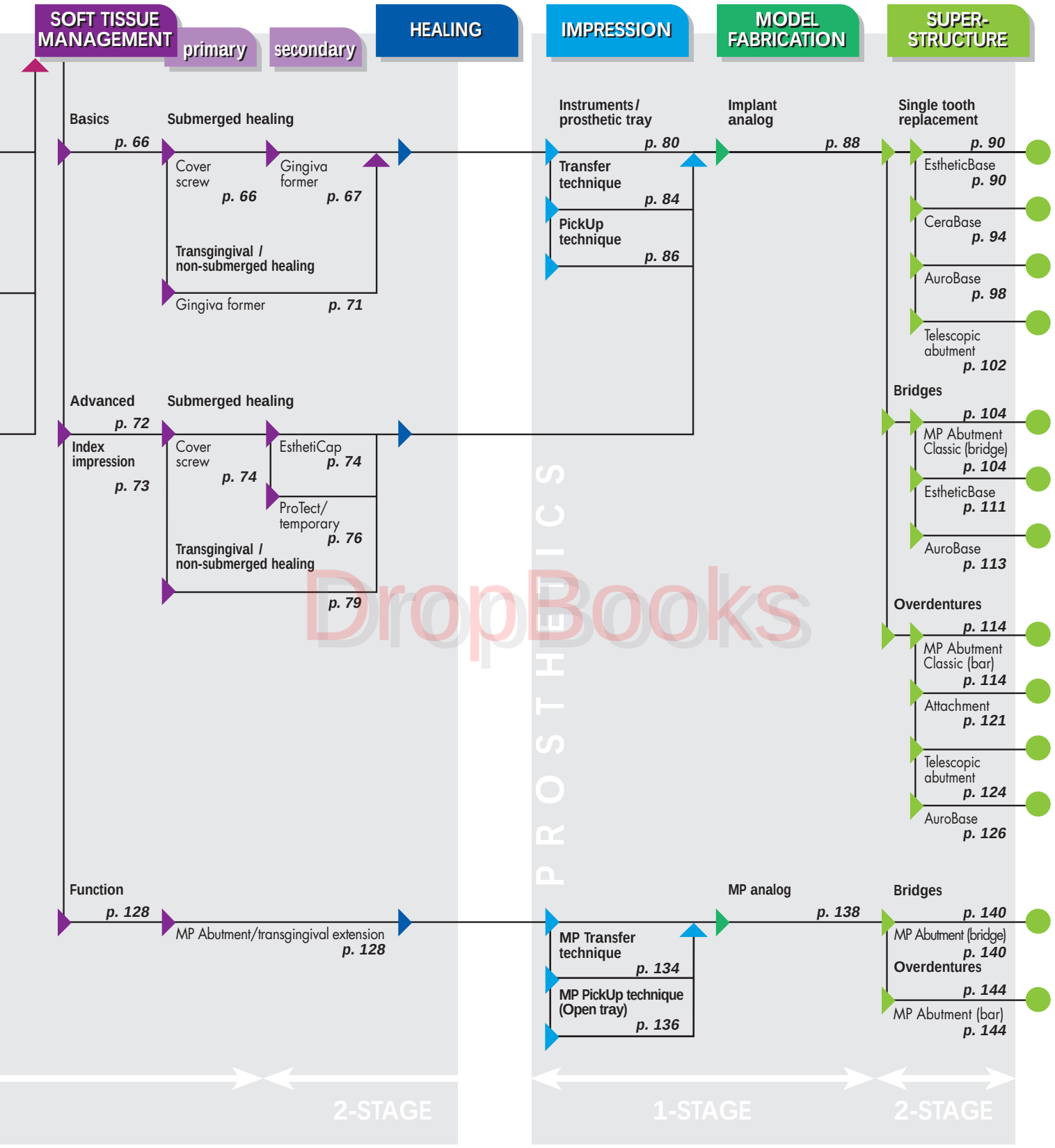
FRIALIT®-2 Navigation for dental esthetics, surgery and prosthetics: The process

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Dear Customer,

Deciding on the right implant system is becoming more and more difficult with the ever-increasing range of products on the market today. We congratulate you on your purchase of the FRIALIT®-2 implant system and believe that you have made the right decision for long-term success because:

- *The FRIALIT® implant system, which has been under continuous development since 1974, is one of the best scientifically documented implant systems in the world.*
- *The visionary concept of tooth-by-tooth reconstruction and immediate implant placement is now the standard of care.*
- *The unique root-analog stepped implant design yields results that meet the highest esthetic demands.*
- *The FRIALIT® implant system is a simple, flexible and clear prosthetic system for all cases, simplifying communication between the dental technician and the restorative dentist.*

The advanced FRIALIT®-2 implant system offers you a complete solution that covers the entire spectrum of indications based on the latest surgical techniques. It provides improved peri-implant soft tissue esthetics and prosthetic reconstruction with assured long-term success.

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Clinical case study: Dr. J. Heldridge, Dr. M. Johnson/USA

FRIALIT®-2 Concept

Prof. Dr. W. Schulte was made an honorary member of the Academy of Osseointegration in 1998 in recognition of his life's work.

Dr. med. dent. H.-J. Hartmann, Tutzing, Germany, clinical associate in the development of FRIALIT® to the FRIALIT®-2 implant system

The success story of the FRIALIT® implant system began in 1974 with the development of the Tübingen implant under the direction of Professor Dr. Willi Schulte.[1, 2] **The FRIALIT® Tübingen immediate implant**, the first root-shaped implant system adapted to the socket, was developed in close cooperation with the Universities of Tübingen and Heidelberg. This development was extremely important in the history of implant dentistry.

The long-term clinical experience with the Tübingen immediate implant, and later with the FRIALIT®-2 implant, confirms that implantation at the earliest possible opportunity after tooth loss:

- Prevents loss of important hard and soft tissue structures.
- Ensures optimum functional and esthetic results.
- Shortens the treatment time for the patient

Scientifically confirmed long-term success rate of 97%

The continuing development of FRIALIT® to the FRIALIT®-2 implant system is the result of:

- The evaluation of more than 700,000 clinical data points
- More than two decades of documentation
- The long-term follow-up of 1,064 implants in 731 patients over 12 years

All this makes FRIALIT®-2 one of the best documented implant concepts thoroughly based on scientific studies. It also explains the unprecedented long-term success rate of 97 % with all indications and implant-prosthetic measures (including augmentation) after 6 years.[3–7]

FRIALIT®

1974
Start of development of FRIALIT® (Tübingen implant)

1976
Clinical studies of FRIALIT®

1977
Expansion of clinical studies of FRIALIT® to 11 universities

1980
Approval and market introduction of FRIALIT®

1985
Evaluation of 700,000 data points on 1,064 implants in 731 patients

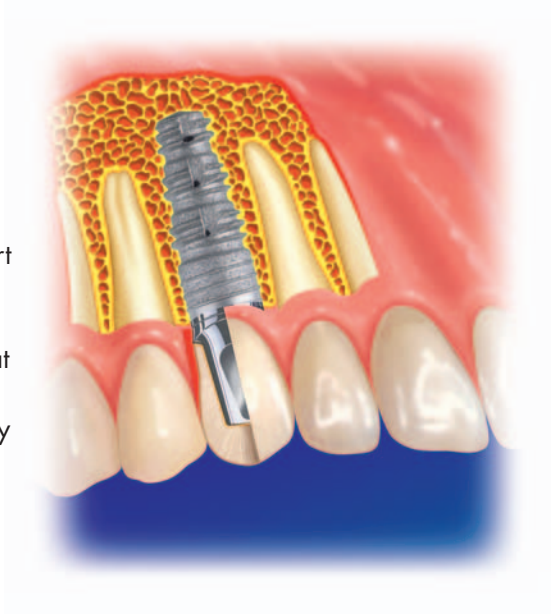
1988
Continuing development of the FRIALIT®-2 implant system

FRIALIT®-2

1990
Start of FRIALIT®-2 clinical trials

The idea: prevention instead of intervention

Innovative implant concepts should not just be considered the last resort for treatment of the edentulous and frequently atrophied jaw. Teeth should be replaced tooth-by-tooth at the earliest possible opportunity to prevent hard and soft tissue atrophy and ensure long-term success.



Perfect esthetics

The FRIALIT®-2 implant system, as a further development of the Tübingen implant, is excellent for early tooth-analog reconstruction meeting the highest esthetic demands. The expansion of the system now enables restoration of all indications with FRIALIT®-2 including:

- Spaces with adjacent teeth
- Free-end cases
- Edentulous jaws

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FRIALIT®-2 implants can be used for:

- **Immediate implant placement** at the earliest possible opportunity after tooth loss
- **Delayed-immediate implant placement** after healing of the soft tissue over the socket
- **Late implant placement** after bone consolidation of the socket.

1992
Market introduction of the FRIALIT®-2 implant system

1993
Complete color-coding of all FRIALIT®-2 system components

1995
Market introduction of the FRIALIT®-2 Hermetics and FRIALIT®-2 TransferCaps

1997
FRIALIT®-2 CeraBase
FRIALIT®-2 AuroBase
FRIALIT®-2 ProTect
FRIALIT®-2 BoneCondenser

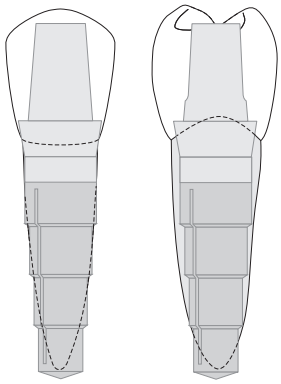
1999
FRIALIT®-2 Synchro stepped screw FRIALIT®-2 BoneExpander

10-year anniversary of the FRIADENT deep profile surface

2000
FRIALIT®-2 MP abutment
FRIALIT®-2 Select abutments, sleeves and try-in implants
FRIALIT®-2 Cortical drill
FRIALIT®-2 BoneProfiler

2001
FRIALIT®-2 D 3.4 mm Implant
FRIALIT®-2 EstheticBase

FRIALIT®-2 Concept



Nature as the example

The crown, root configuration and length of natural teeth are perfectly adapted to meet the demands placed on them in the stomatognathic system including:

- Grinding food for easier digestion
- Mid-face support
- Proper phonetics.

Functional loading is the basis of the rebuilding processes in the alveolar bone. This stimulation helps retain the structure of the bone and enable the bone to support the soft tissues. The teeth and the periodontium must be able to withstand forces of up to 4000 N during chewing. The chewing forces increase multiple-fold from anterior to posterior.[8]

The goal of dentistry has always been to restore both the function and the esthetics of lost or damaged teeth to a state as close to the original as possible. A number of studies on extracted teeth have provided average values for the size and length of various teeth for use as reference during prosthetic rehabilitation.

The values summarized in the table show the following diameters for teeth in the maxilla:

- The measured values vary at the cementum enamel junction as follows:
  – 5 to 8 mm mesial-distally and
  – 5 to 10 mm facial-palatally.
- The facial-palatal dimension of the crowns in the maxilla ranges from 6 to 11 mm.

Similarly, the diameters of the teeth in the mandible are as follows:
- At the cementum enamel junction
  – 3.5 to 9 mm mesial-distally and
  – 5.3 to 9 mm facial-lingually
- The mesial-distal crown diameter for mandibular teeth is 5 to 11 mm.

The root lengths are:
- Between 11 and 17 mm in the maxilla
- Between 11 and 16 mm in the mandible

Average dimensions of remaining teeth (in mm) per Russell and Wheeler

In addition to its function in assisting nutrition and speech, a healthy tooth in a balanced chewing system has an esthetic function. This is important to patients and has a significant influence on their psychological well-being.

Tooth	Length of crown	Length of root	Mesio-distal diameter at CEJ	Mesio-distal diameter of crown	Labio- or buccolingual diameter at CEJ	Labio- or buccolingual diameter of crown
Maxillary teeth						
Central incisor	10.5	13.0	7.0	8.5	6.0	7.0
Lateral incisor	9.0	13.0	5.0	6.5	5.0	6.0
Canine	10.0	17.0	5.5	7.5	7.0	8.0
First premolar	8.5	14.0	5.0	7.0	8.0	9.0
Second premolar	8.5	14.0	5.0	7.0	8.0	9.0
First molar	7.5	b* p* 12 13	8.0	10.0	10.0	11.0
Second molar	7.0	b* p* 11 12	7.0	9.0	10.0	11.0
Third molar	6.5	11.0	6.5	8.5	9.5	10.0
Mandibular teeth						
Central incisor	9.0**	12.5	3.5	5.0	5.3	6.0
Lateral incisor	9.5**	14.0	4.0	5.5	5.8	6.5
Canine	11.0	16.0	5.5	7.0	7.0	7.5
First premolar	8.5	14.0	5.0	7.0	6.5	7.5
Second premolar	8.0	14.5	5.0	7.0	7.0	8.0
First molar	7.5	14.0	9.0	11.0	9.0	10.5
Second molar	7.0	13.0	8.0	10.5	9.0	10.0
Third molar	7.0	11.0	7.5	10.0	9.0	9.5

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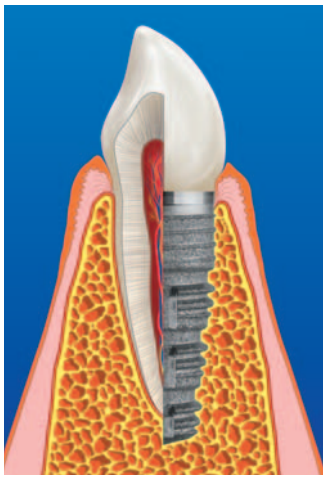
Wheeler, R.C.: A textbook of dental anatomy and physiology. ed. 4, Philadelphia, 1965, W. B. Saunders Co.

** The sum of the mesiodistal diameters, both right and left, which gives the arch length, is 128 mm in the maxilla and 126 mm in the mandible*

*** Lingual measurement is approximately 0.5 mm greater*

Implant macro-design

Nature as the starting point for the implant design: The root of the tooth



The FRIALIT®-2 implant was developed to mimic the shape of the root.

- The stepped cylinder is the basis of the FRIALIT®-2 implant.
- The cylindrical implant body narrows in 3 – 5 steps of 0.4 by 0.6 mm each (depending on the implant diameter) from the coronal edge to the apex.
- The edges of the steps are rounded off to reduce stress concentration.
- The following three variations of FRIALIT®-2 implants are derived from the basic shape of the stepped root-analog design:

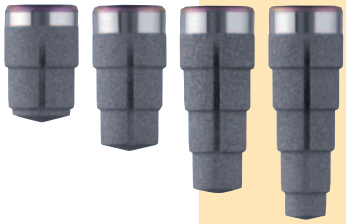
Stepped cylinder

Stepped screw

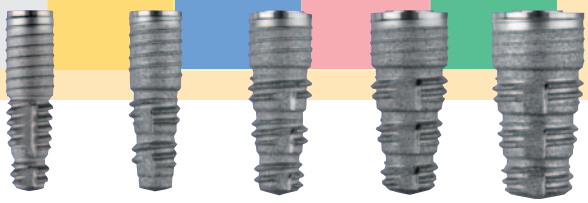
Synchro stepped screw

- The diameters of the FRIALIT®-2 implants are specified based on the average mesial-distal values for natural teeth at the CEJ of the tooth (table on page 9).

FRIALIT®-2 implants are available in
– diameters from 3.4 – 6.5 mm and
– lengths from 8 – 15 mm
to match natural teeth.



Ø	3.4 mm	3.8 mm	4.5 mm	5.5 mm	6.5 mm
Länge	–	–	8 mm	8 mm	–
	11 mm	11 mm	10 mm	10 mm	10 mm
	13 mm	13 mm	13 mm	13 mm	13 mm
	15 mm	15 mm	15 mm	15 mm	15 mm



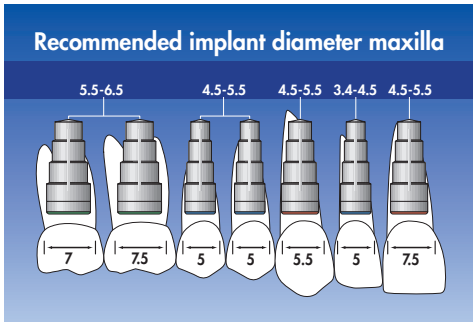
Implant diameters and lengths

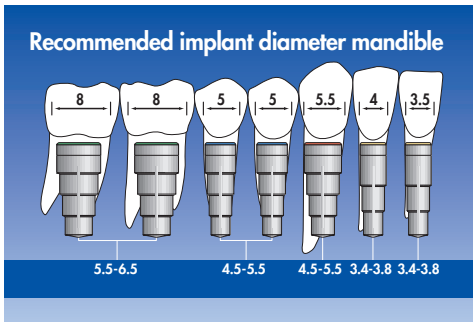
These implant diameters make it possible to manufacture implant-supported reconstructions that meet the highest functional and esthetic demands.

The maximum horizontal extension from the implant diameter to the largest mesial-distal crown diameter is 4.5 mm (molar region). The taper of the prosthesis with the shape of the crown and the interproximal space allow transitions corresponding to the natural shape of the crown.

The oval shape of the root of the tooth is not taken into account when designing the implant to make it as easy and as safe as possible to prepare the implant bed and place the implant. Blood-filled facial gaps of less than 0.5 mm regenerate bone without requiring augmentation. A thickness of at least 1.5 – 2.0 mm of bone around the implant is desirable.

Biomechanical and clinical studies[8] have shown that the stepped reduction of a cylindrical implant body from the top to the apex has a positive influence on the distribution of forces and consequently on the long-term success rate.





Recommended implant diameters for the maxilla and mandible

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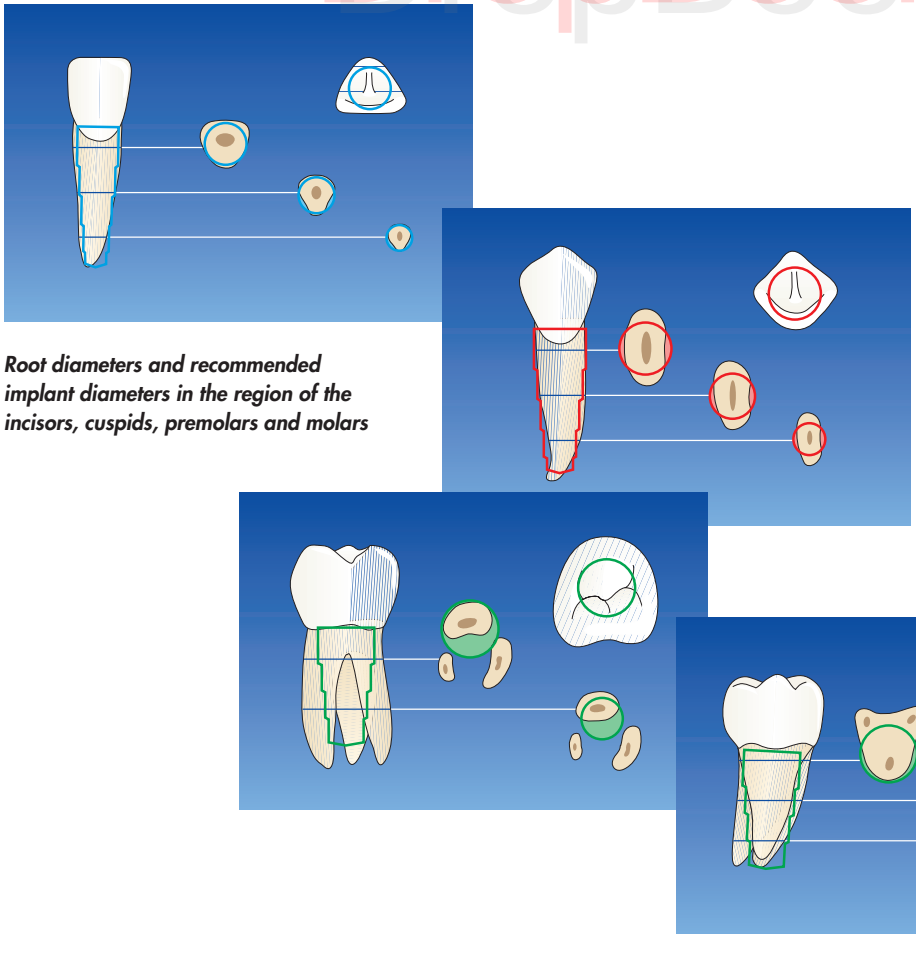
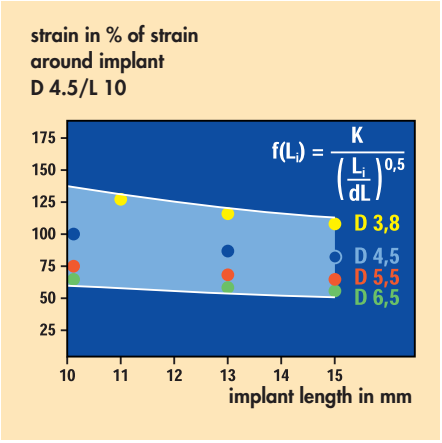
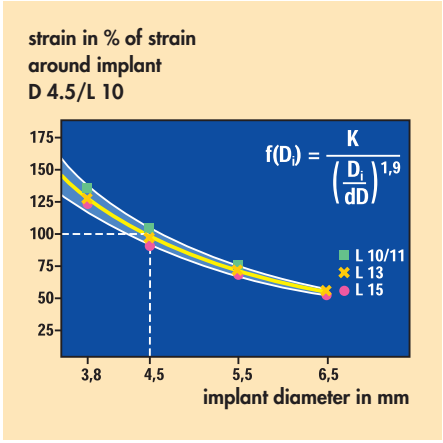


Root diameters and recommended implant diameters in the region of the incisors, cuspids, premolars and molars

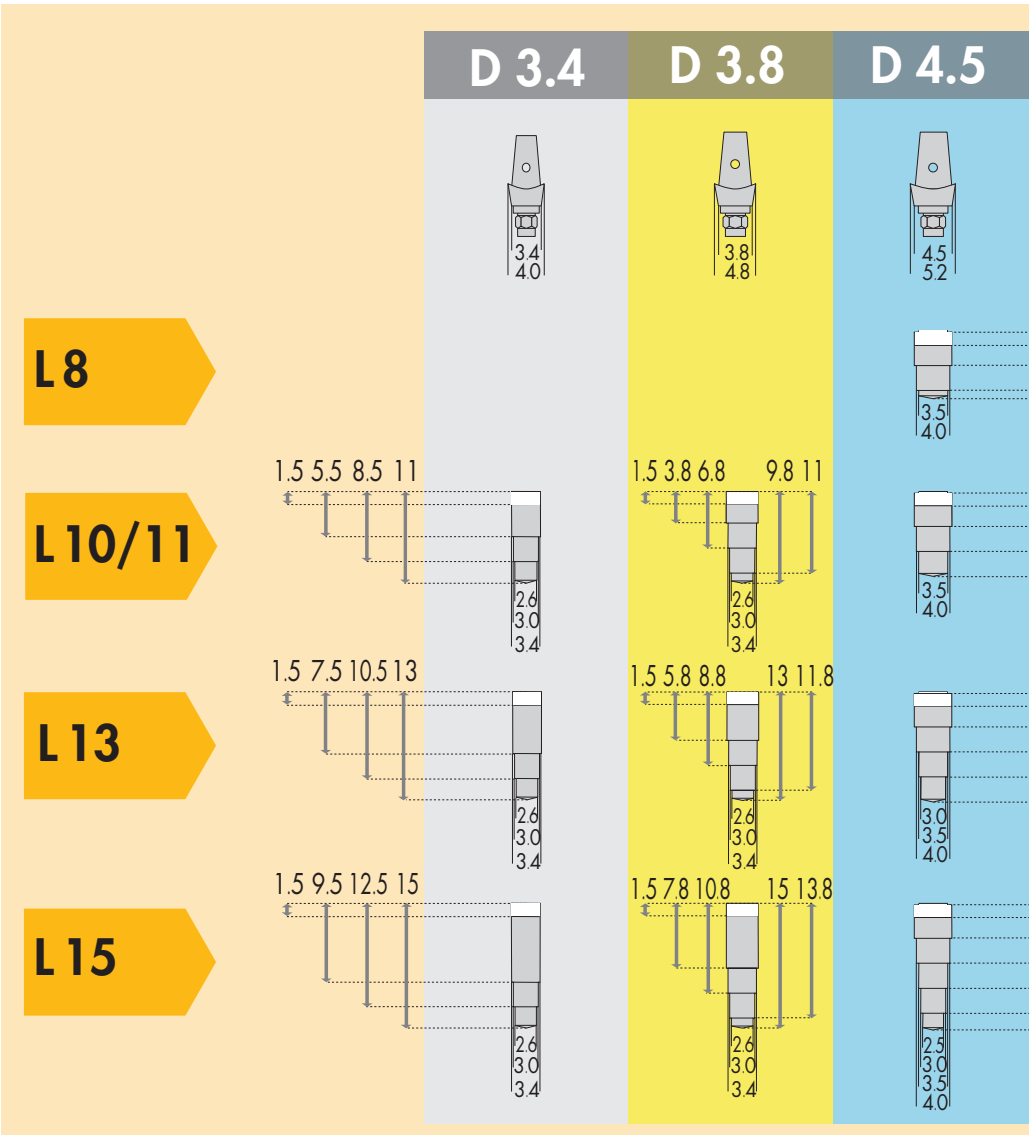
Nature as the starting point for the implant design: The root of the tooth

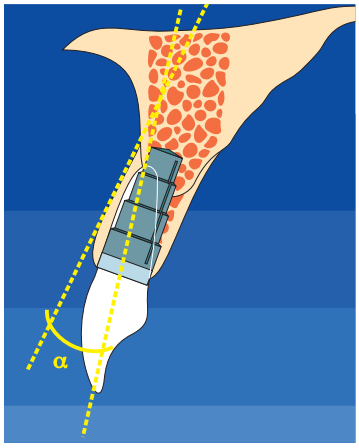


Influence of implant length on the loading of the tooth:
If the implant length is increased from 10 to 15 mm, the maximum cervical load is only reduced by 10%

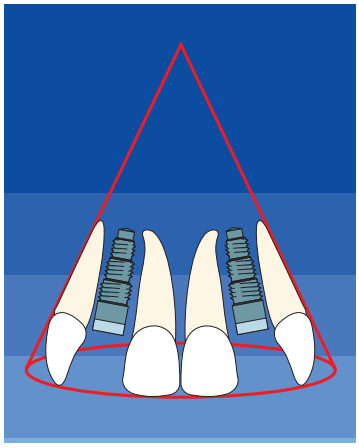


Influence of implant diameter on the loading of the tooth:
If the implant diameter is increased from 3.8 to 6.5 mm, the maximum cervical load is reduced by 60%

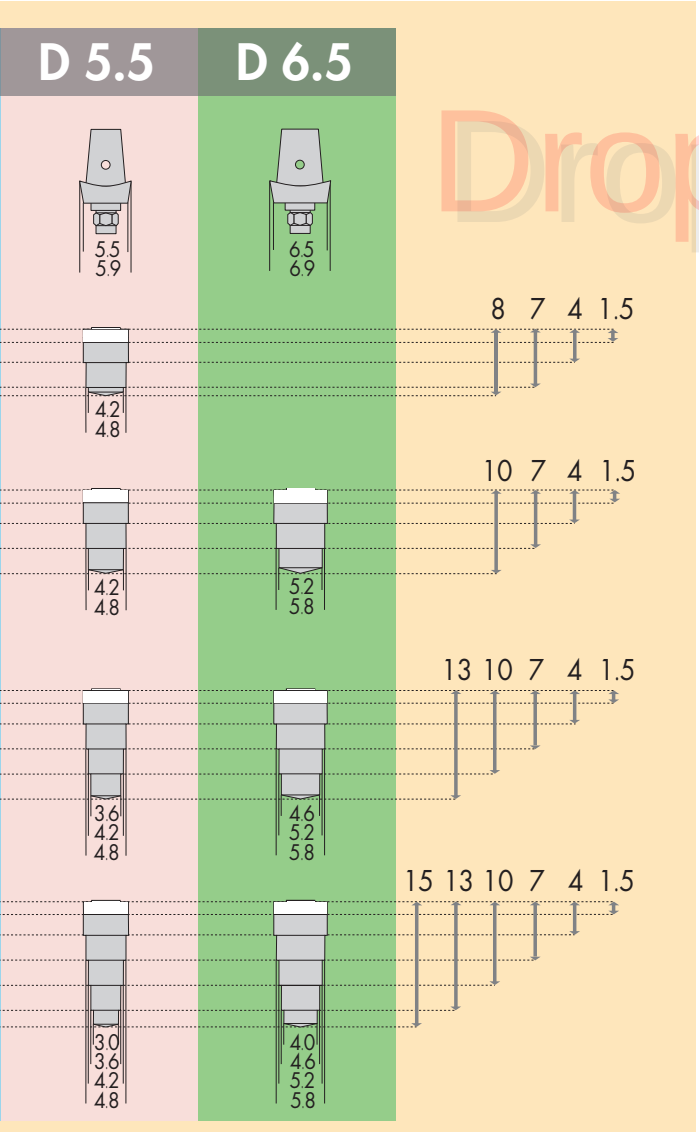




The stepped implant geometry allows optimum axial placing of the implant with regard to functional and esthetic considerations; reducing the axial angle by up to 5% simplifies the prosthetic process



The insertion of root-analog implants minimizes the risk of injury to adjacent roots and supports the anatomical shape of the maxilla



Dimensions of the FRIALIT®-2 implants and implant-abutment connections in mm

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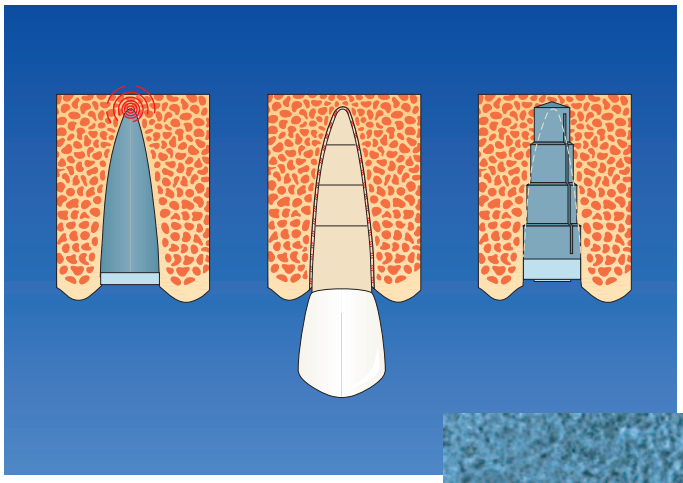
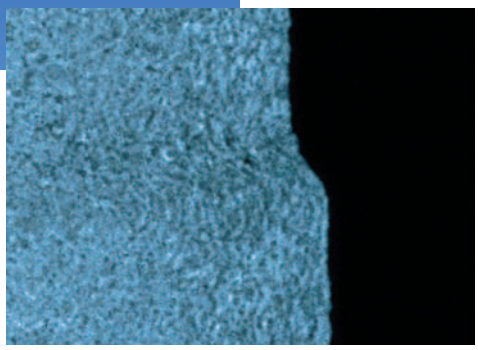
Nature as the starting point for the implant design: The root of the tooth

The steps of the implant act as intra-osseous stops, through which the chewing forces are transmitted not only to the crestal but also to lateral and apical components of the peri-implant bone.
The edges of all implant steps are rounded off to prevent stress peaks during insertion of the implant.



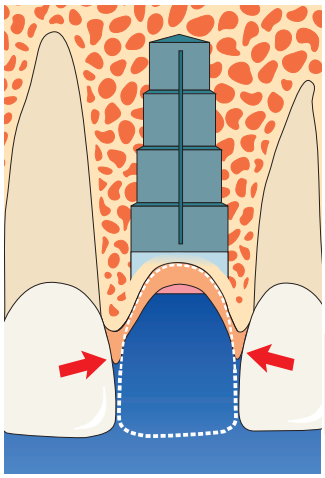


Intra-osseous stops for optimum distribution of forces. Rounded implant steps are designed to prevent stress peaks.

Due to the enlarged surface of the implant, the implant-bone interface is increased and forces can be distributed over a larger area. Consequently, the danger of overloading is minimized and the bone-to-implant contact is enhanced.

FRIALIT®-2 – The unique implant design

The root-analog stepped design of the FRIALIT®-2 implant offers optimum functional transmission of forces from the implant to the peri-implant bone. The alveolar bone is supported and the interproximal space can be reconstructed to support the papillae. The root-analog design significantly increases the prosthetic and biomechanical stability. This has been confirmed by FEM analyses.[8] Natural soft tissue contours are enhanced, enabling the reconstruction to meet the highest functional and esthetic demands. The implant shape makes insertion of the implant easy and safe and prevents perforation of the labial/buccal plate. The modified surface offers a greater implant-bone interface and enhances cellular interaction.



Reconstruction of the interproximal space to meet the highest functional and esthetic demands.

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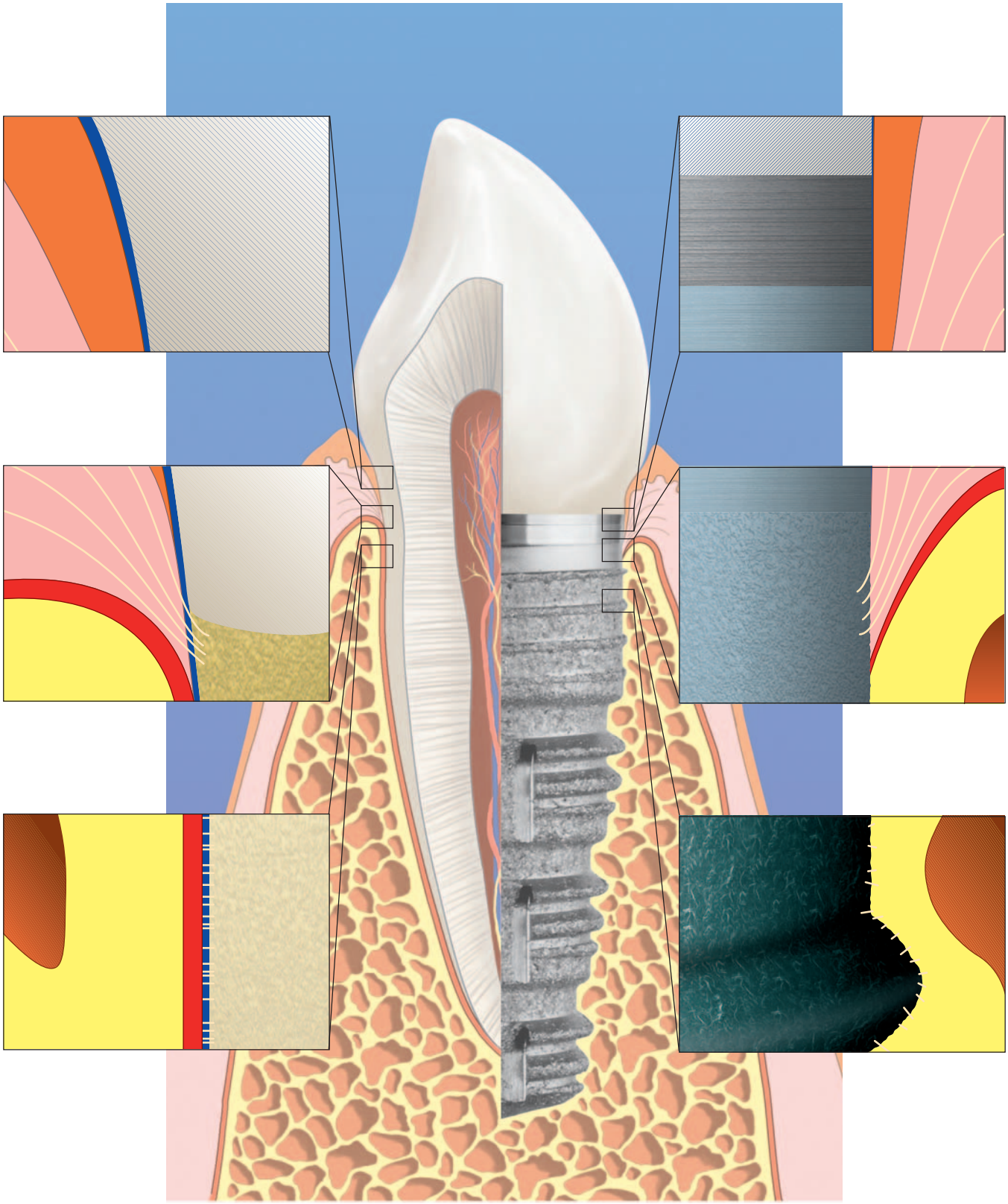
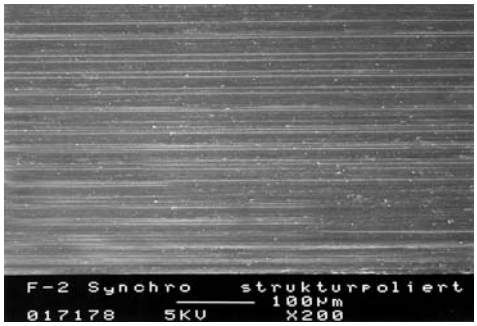
Implant micro-design
Implant surface: assured contact



The epithelium

The epithelium has a sealing and protective function. In the healthy periodontium of a natural tooth, the cells of the non-keratinized squamous epithelium form a ring on the root surface in the region of the CEJ of the tooth. There are fibrous bundles in a circular pattern extending into both tissues in the transitional region to the subepithelial connective tissue. The epithelium, therefore, primarily protects the subepithelial connective tissue against mechanical irritation and microbial invasion.
Studies show that the surface topography influences soft tissue cell proliferation and morphogenesis. The specific microstructure of the machine-polished implant cervix ensures cellular orientation of the fibroblasts (contact guidance). Microscopically small circular grooves in a smooth implant surface with circumferential deposition of the fibers offer an ideal environment for imitating a healthy periodontium at the interface with the epithelium.



Machine-polished section (SEM image) for optimum epithelial apposition

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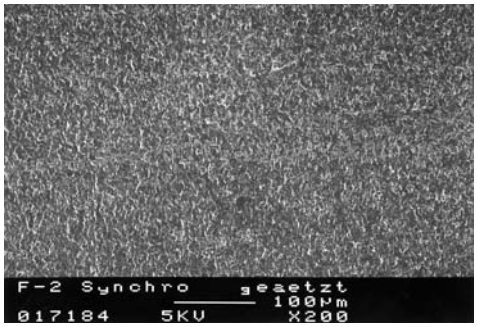
The subepithelial connective tissue

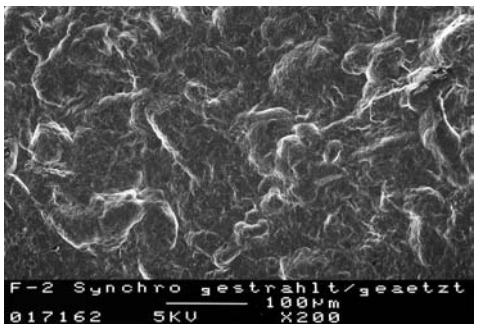
The subepithelial connective tissue supports the adaptation of the epithelium. In the healthy periodontium of a natural tooth, the subepithelial connective tissue is connected to the root by a network of fibers extending into the cementum. A microscopic view of the surface of the root shows a rough surface. This special microstructure can be perfectly emulated by an etched implant surface, resulting in contact guidance. The tissue-building cells are deposited on this surface structure and can bridge small gaps with their extensions.



Etched section (SEM image) for optimum adhesion of connective tissue fibers

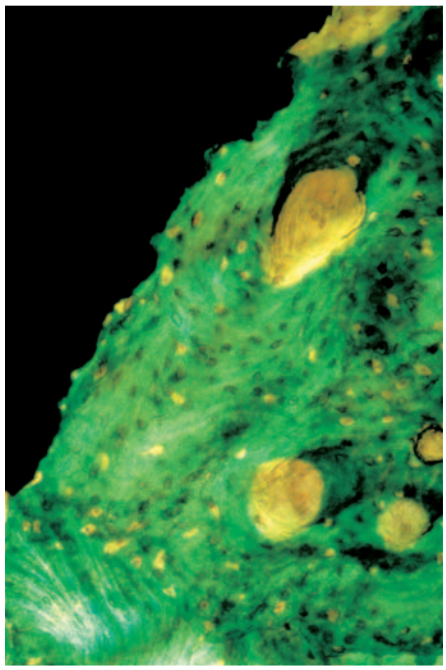
Implant surface: assured contact

The peri-implant hard tissue



The FRIADENT deep profile surface (grit-blasted/etched, SEM image) for osseointegration and enlargement of the contact area.

The endosseous section of an implant should encourage regeneration of the bone to ensure optimum distribution of forces over as large an area as possible. Studies[11–15, 41] have demonstrated that osteoblasts require a porous and rough surface structure to be able to synthesize more bone-specific matrix and to mineralize subsequently. The same studies have also shown that the secretion of bone growth factors, such as prostaglandin E2 (PGE2) and transforming growth factor β1 (TGF-β1), are increased by a rough surface.
An ideal implant surface in the endosseous region offers a large contact area and an optimum peak-to-valley height for cell deposition. A unified peak-to-valley height comparable to the cementum also assists the adhesion of fibrin and collagen fibers. This special microstructure can be perfectly emulated by an etched implant surface, resulting in contact guidance. The bone-forming cells are deposited in this surface structure and can bridge small gaps. The surface area can also be further increased for the greatest possible bone contact by additional grit-blasting of the implant surface. This increases the number of adhering cells without negatively influencing the surface properties for optimum cell deposition.



Bone in contact with the implant

Implant surface requirements

Successful dental rehabilitation with implant-supported prostheses requires a fixed connection between implant and bone protected by the soft tissue.

The implant surface must meet the following requirements:
- Sterility
- Free from contamination
- Biologically inert or bioconductive behavior
- Morphological adaptation to the tissue
- Mechanical integration and integration with the bone
- Special micro-morphology for cellular adhesion and interaction with the gingival tissue

The processing of the surface enables the implant body to adapt to the functional requirements of the various tissue types.

FRIADENT implants are roughened in the endosseous section by various processes:

Additive

- **Titanium-plasma spray coating (stepped cylinder)**
- **Hydroxyapatite coating (stepped cylinder)**

Subtractive

- **Deep profile surface – grit-blasted and etched (stepped screw)**

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Implant surface: assured contact

The FRIALIT® Tübingen immediate implant

The surface modifications developed by FRIADENT have been in successful clinical use for decades and continue to be developed as new technologies arise.

- As early as 1974, the FRIALIT® implant (Tübingen type) was grit-blasted with FRIALIT® bioceramics for the greatest possible bone contact. The surface was provided with lacunae.
- The TPS surface (titanium-plasma coating) has been in clinical use since 1978.
- The hydroxyapatite coating was introduced in 1987. The mineral used in this process corresponds to the inorganic phase of the bone matrix.
- In 1989, FRIADENT was the first manufacturer in the world[44] to treat the surface of the FRIALIT®-2 screw implant with an exclusively subtractive process by grit-blasting and etching. Since then, an increasing number of manufacturers have adopted this retentive and biologically inert microstructure.

Additive process

This technology produces the special surface morphology by adding material to the implant body. Additive processes are only used on FRIADENT cylindrical implants.

FRIADENT TPS (titanium-plasma spray) coating

The surface is roughened by computer-controlled grit-blasting. Then the surface is coated with pure titanium powder, which is blown through a plasma flame of approximately 20,000° C, melting the surface of the coating. The titanium powder solidifies on the implant surface in a fraction of a second. This yields a three-dimensional titanium coating approximately 50 µm thick. The peak-to-valley height (Rt) is approximately 20 µm and the arithmetical mean roughness value (Ra) is 3.5 µm.

The **FRIADENT TPS surface** has been clinically proven over more than 20 years of use.[1, 6] More than a million implants with this type of surface have been placed.

Advantages:

- Favorable bone response
- Extremely high adhesion
- Excellent biological compatibility with approximately 10% titanium oxide content

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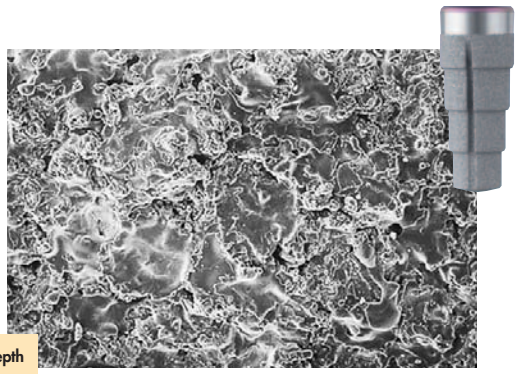
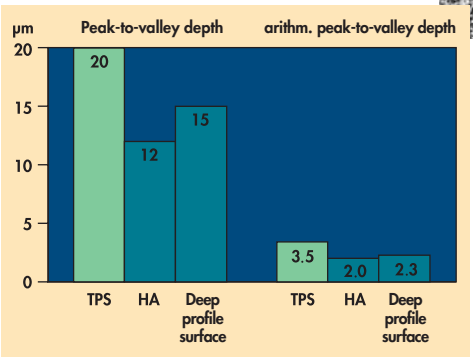
Scanning electron microscope image: FRIADENT TPS coating





Peak-to-valley depth and average peak-to-valley depths of the FRIADENT surfaces

Implant surface: assured contact

FRIADENT HA (hydroxyapatite) coating

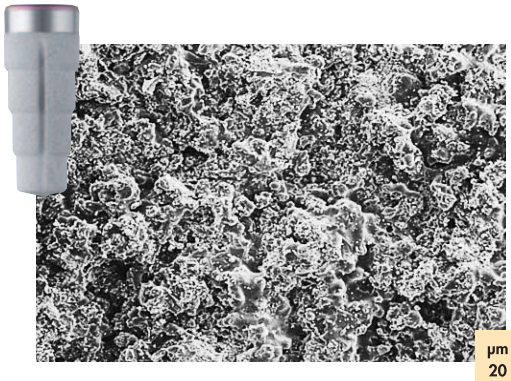
The HA coating is created similarly to the grit-blasting technique of the TPS surfaces. In this process, HA particles are used instead of titanium powder. The peak-to-valley height (Rt) is 12 µm and the arithmetical mean roughness value is 2 µm.

The **FRIADENT HA surface** has an osteoconductive effect (the bone regenerates quickly) and studies show that full strength is reached in approximately eight weeks.[47]

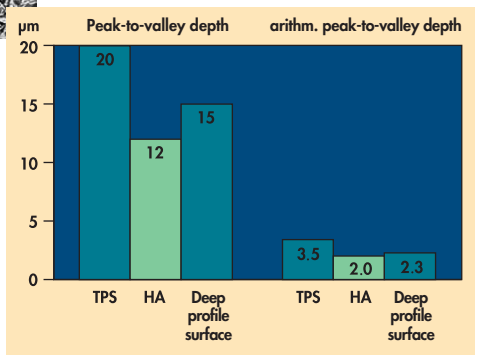
Advantages:

- Improvement of local bone stability
- Fast bone apposition during the healing phase

Bone-formation processes result in fast integration of HA-coated implants. Studies have shown that there is increased bone apposition in the initial phase of bone regeneration on HA surfaces. However, bone resorption processes can also remove HA. For this reason, the use of implants with an HA surface is contra-indicated for uncovered healing and immediate implant placement.



Scanning electron microscope image: FRIADENT HA coating



Peak-to-valley depth and average peak-to-valley depths of the FRIADENT surfaces

Subtractive process

This technology produces the special surface morphology by removing material from the implant body. Material removal processes are used with all FRIALIT®-2 screw implants.

FRIADENT deep profile surface

The micro-retentive, deep profile surface of the implant is manufactured in four stages: grit-blasting, etching, neutralization and cleaning. Grit-blasting produces a defined macro-roughness. Etching with mineral acids further increases the implant surface (micro-roughness).
The peak-to-valley depth (Rt) is 15 µm and the arithmetical average peak-to-valley height is 2.3 µm*.

The **FRIADENT deep profile surface** (grit-blasting and etching) on FRIALIT®-2 stepped screws:

- Prevents loss of particles of coating while screwing in the implant.
- Increases the surface area of the implant.
- Favors cell deposition and the expression of growth factors, thus, osseointegration.
- Accelerates cell response by macro-morphology and micro-morphology.

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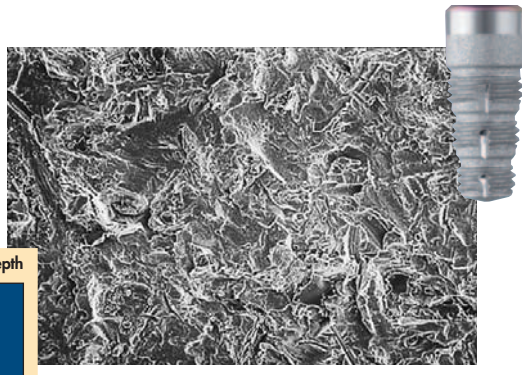
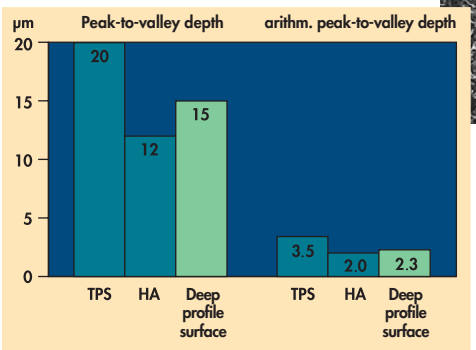
A specific roughness favors the regeneration potential at the implant-bone interface. Comparative studies[43] with machine-polished implants have demonstrated that rough surfaces have significantly increased removal torque. The tissue-adapted surface topography thus has a positive influence on the primary stability and osseointegration, as well as on the preservation of the peri-implant bone and soft tissue apposition.

Scanning electron microscope image: FRIADENT deep profile surface





Peak-to-valley depth and average peak-to-valley heights of the FRIADENT deep profile surface in comparison

**General conditions: 10 linear measurements per test body, all average values ± standard deviations in µm. Measurement distance: 1 mm, 1000 measurement points/mm. Instrument: Microfocus Compact 3-D surface measurement system, UBM (Ettlingen). Calculation: filter wave length 0.2 mm, Gauss filter, tool mark suppression.*

Implant surface: assured contact

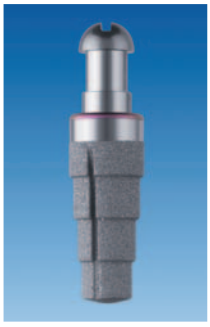
Macro-retentive and micro-retentive implant surfaces in the endosseous section

- **Favor initial adhesion, proliferation and, ultimately, matrix synthesis of osteoblast cells**
- **Accelerate reliable osseointegration due to high primary stability**
- **Stabilize the anchoring of the implant in the bone due to an intimate bone-to-implant contact**
- **Ensure long-term success with maximum biocompatibility and targeted distribution of force**

FRIALIT®-2 stepped cylinder, stepped screw and Synchro stepped screw: The optimum implant for every situation

Long-term success in implant dentistry is influenced by the interaction of various factors. The dynamic interaction between surface topography and peri-implant bone can be enhanced by the specific implant design and the related retention properties.

The FRIALIT®-2 stepped cylinder

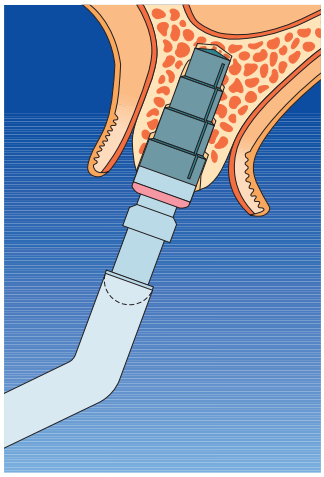


The basic shape of all FRIALIT®-2 implants is a stepped cylinder with a reduction of the diameter towards the apex in 3 to 5 steps by 0.4 to 0.6 mm per step (see table page 12/13). The number of steps depends on the length of the implant (see table page 10). The coronal section of the implant body has a 1.5 mm collar. The endosseous section is available with the following coatings for enhancing osseointegration:

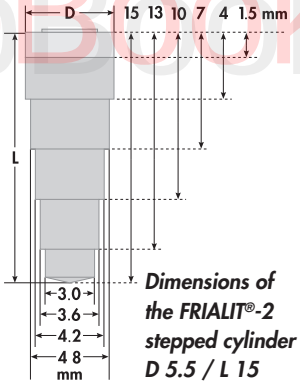
- TPS (titanium-plasma spray) or
- HA (hydroxyapatite) coating

There are three longitudinal grooves on the endosseous section of the implant. All FRIALIT®-2 implants have a deep internal implant-abutment connection with parallel-walled sections above and below the hex. The color-coded cover screw and the placement head are pre-mounted on the implant.

The longitudinal grooves provide a decompression by allowing interstitial fluids or blood to drain out. The longitudinal grooves in the middle of one of the hex flats should be lined up to the facial. This orientation will correctly line up the internal hex if an angled EstheticBase abutment is used. The stepped cylinder shape enables the implant to be inserted to the last step by finger pressure alone. The stepped cylinder is seated by lightly tapping the insertion instrument, which is positioned on the pre-mounted placement head, with the surgical hammer.



Insertion of the FRIALIT®-2 stepped cylinder with seating instrument



Dimensions of the FRIALIT®-2 stepped cylinder D 5.5 / L 15

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Advantages of the FRIALIT®-2 stepped

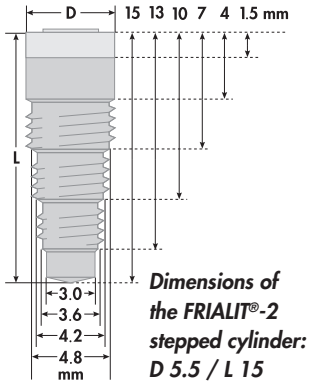
- **Improvement of the implant site in the event of low bone density**
- **Atraumatic insertion in extremely cortical bone**
- **High stability, strong bone adhesion at the titanium surface**
- **Simple press-fit insertion makes it the ideal implant for all standard situations**
- **Simple dental technique, simple handling during insertion**

Implant surface: assured contact

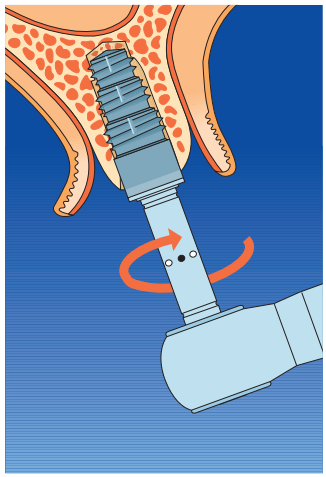
The FRIALIT®-2 stepped screw

The basic shape of the FRIALIT®-2 stepped screw is similar to the FRIALIT®-2 stepped cylinder. The top step has no threads and has a 1.5 mm machine-polished collar. The remaining part of the implant body has the FRIADENT deep profile surface. The implant has a self-tapping thread from the second step. The placement head is pre-mounted in the implant and the cover screw is in the silicone stopper of the inner vial.

The implant can be inserted by finger pressure alone and screwed into the final position with the ratchet implant driver or contra-angle handpiece.



Dimensions of the FRIALIT®-2 stepped cylinder: D 5.5 / L 15



Insertion of the FRIALIT®-2 stepped cylinder using the seating instrument

Advantages of the FRIALIT®-2 stepped screw

- **Preservation of the facial plate during immediate implant placement**
- **Increased implant surface due to the threads**
- **Increased stability during immediate implant placement**
- **Accelerated cell response with safer osseointegration with the proven FRIADENT deep profile surface**
- **Only three revolutions for complete seating of the implant**

The FRIALIT®-2 Synchro stepped screw

Both the implant core and the implant-abutment connection of the FRIALIT®-2 Synchro stepped screw correspond to the design of the above-described stepped cylinder. The crestal implant cervix is only machine-polished for a length of 0.4 mm, which joins an etched microstructure in the apical direction over a length of 1.1 mm. The implant surface has an innovative thread design with condensation and cortical threads, which has the proven FRIADENT deep profile surface.
As with the FRIALIT®-2 stepped screw, the color-coded cover screw is supplied in the silicone stopper of the inner vial of the implant package and the placement head is pre-mounted.

The FRIALIT®-2 stepped screw is inserted to the penultimate step with finger pressure. The implant is screwed into its final position with the implant driver combined with the ratchet or contra-angle handpiece. The synchronized design enables the apical condensation thread to act as a thread cutter for the cortical thread. This means that the thread for the highest step is atraumatically precut by the apical condensation thread of the second step. The implant is additionally fixed by the synchronized thread on the highest step. Machine-assisted rotation is made easier, even in augmented bone, and high primary stability is reliably achieved. The apically enlarged thread depth leads to high primary stability in connection with a narrower thread profile. In addition, the specifically tissue-adapted surface improves the deposition of epithelial cells and supports connective tissue adaptation.

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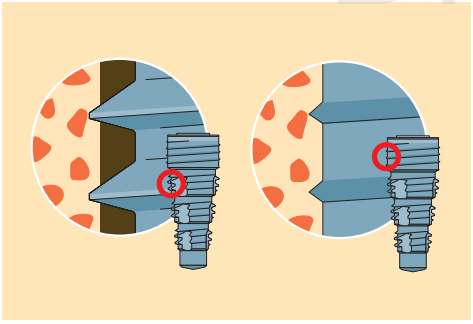
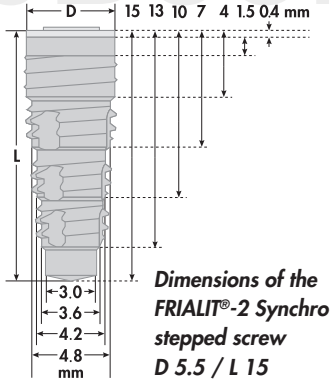
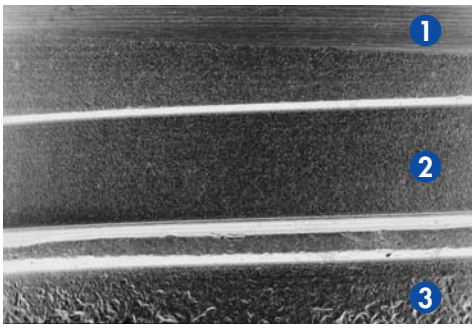


Insertion of the FRIALIT®-2 Synchro stepped screw: pre-tapping with apical threads (left); fixation of the implant with synchronized cortical threads (right).



Dimensions of the FRIALIT®-2 Synchro stepped screw D 5.5 / L 15



Tissue-adapted surface of the FRIALIT®-2 Synchro stepped screw:
1. Machined to a high finish for ease of hygiene
2. Etched microstructure for connective tissue adaptation
3. FRIADENT deep profile surface (grit-blasted and etched)

Implant surface: assured contact

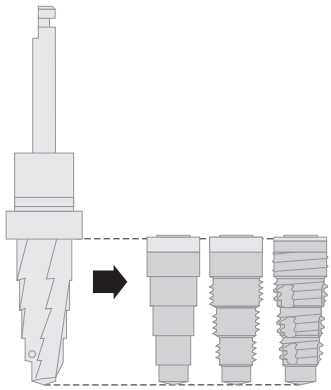
Advantages of the FRIALIT®-2 Synchro stepped screw

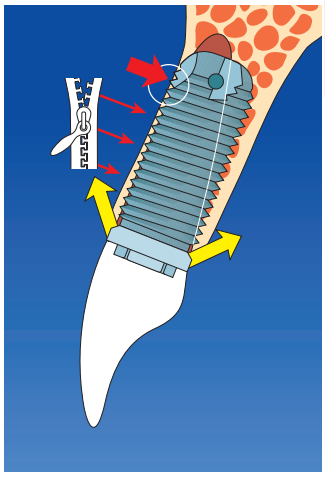
- Universally applicable for all bone classes from type I to type IV[9] with synchronized thread design
- Low insertion resistance with atraumatic insertion of the implant in high density bone
- Optimum fixation of the implant, particularly with low residual bone height and/or in combination with augmentation
- Increased self-tapping performance in cortical bone
- Maximum primary stability with a special thread design (condensation and cortical threads)
- Optimum surfaces for hard and soft tissues

FRIALIT®-2: The optimum implant for every indication

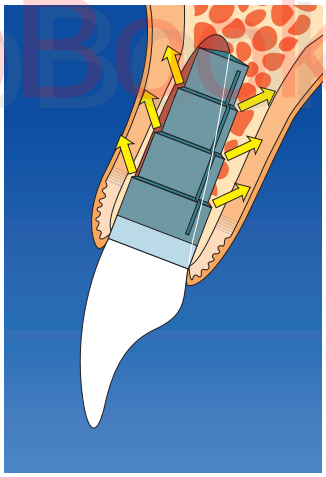
The diameter-oriented concept with root-analog FRIALIT®-2 implants offers fundamental and decisive advantages

- Implants for every bone quality and clinical situation
- Simple prosthetics with root-analog shape and anatomically correct implant position
- Support of the alveolar bone and the overlying soft tissue with crestal design
- Optimum reconstruction of the interproximal spaces
- Minimum loading of the peri-implant bone (due to stress-distributing design)
- Reduction of the risk of perforation of the facial or lingual plates and the risk of injuring the adjacent roots
- Same drills for all three FRIALIT®-2 implant designs

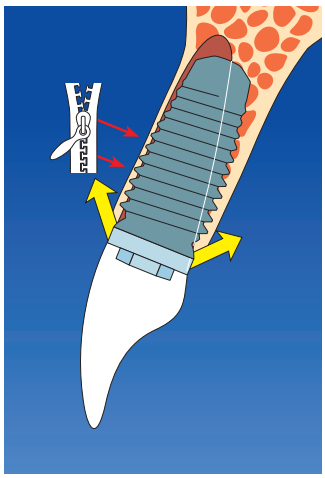




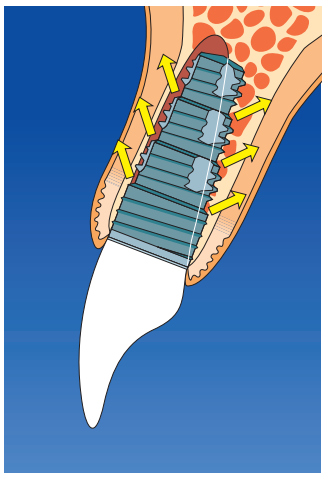
Increased risk of perforation with wide diameter, parallel-walled implants
- *Apical perforation*
- *Zipper effect, facial bone destruction*
- *Stress on the facial osteon*
- *Axial deviation with difficult prosthesis*



FRIALIT®-2 stepped cylinder
- *No stress on the facial wall*
- *No crestal compression*
- *Steps act as intraosseous stops*



Conical shape
- *Zipper effect*
- *Stress on the facial plate*



FRIALIT®-2 stepped screw and Synchro stepped screw
- *No stress on the facial wall*
- *No crestal compression*
- *Steps act as intraosseous stops*

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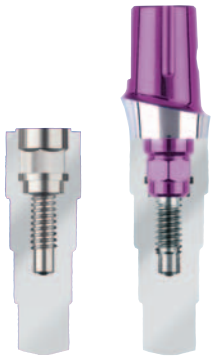
Implant-abutment connection



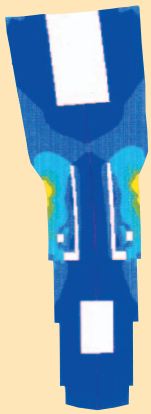
Deep internally positioned implant-abutment connection with anti-rotational stop

Perfect connection

An important feature of the FRIALIT®-2 implant is the deep internal implant-abutment connection, analogous to a "tube-in-tube" mechanism. The rotation stop is secured by a 1.5 mm tall and 2.5 mm wide hex (2.2 mm for D 3.4 mm). Because of the precision of the hex, a residual rotation of less than 1.0° between abutment and implant remains.
There are also parallel-walled guides above and below the hex. The result is an implant-abutment connection that extends over a total length of 3.4 mm into the implant.

Horizontal force components are transmitted directly from the internal geometry of the implant over the abutment. The 1.6 mm diameter FRIALIT®-2 abutment retaining screw secures the abutment to the implant and is not subjected to horizontal stress.
Finite element measurements show that the abutment retaining screw is not loaded by horizontal forces.
The abutment is made additionally stable by a wide prosthetic base on top of the implant.
This design reduces the possibility of screws becoming loose and/or fracturing. State-of-the-art manufacturing technologies ensure maximum possible precision of the mating surfaces. The internal connection greatly increases the occlusal space available for fabricating the prosthesis, particularly in angled cases.

Finite element study: Highest mechanical stability by deep internal, 3.4 mm long parallel-walled implant-abutment connection for a secure occlusal load transfer

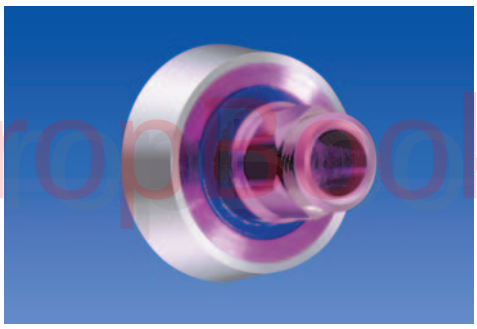


A comparative study of seven implant systems[16] showed that internal rotation stops in the abutment have a positive influence on the stability of the implant-abutment connection.
The study concluded that "… the FRIALIT®-2 system should be favored from the clinical viewpoint."

Advantages of the deep, internal implant-abutment connection

- Stabilization of the connection to withstand lateral forces[16–18]
- Anti-rotational connection of the abutment to the implant[19, 20]
- Unique, simple and precise positioning of the abutment with six positioning options
- Prevention of breakage and loosening of screws
- Optimum usage of the interocclusal distance
- Gap-free implant-abutment connection through micro-precision fit

Unique bacteria-proof sealing between implant and abutment with FRIADENT Hermetics



FRIADENT crown abutments have a groove at their base for the FRIADENT Hermetics sealing ring. Before final placement of the restoration, a blue sealing ring 3 mm in diameter made of non-biodegradable silicone is positioned in the groove of the abutment. When the abutment is fastened down with the abutment screw, the FRIADENT Hermetics sealing ring is pressed against the top of the implant and seals the micro-gap against saliva and bacteria. The FRIADENT Hermetics is only replaced if the superstructure is removed during a recall. FRIADENT Hermetics are available for implant diameters of 4.5 – 6.5 mm.

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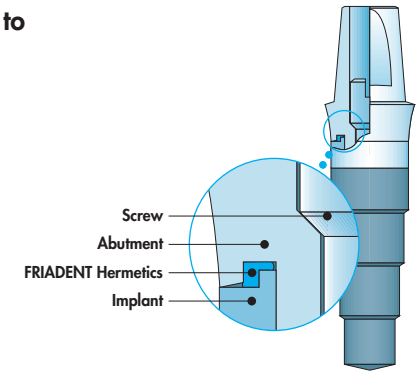
FRIADENT Hermetics

- Bacteria-proof sealing by compression of the silicone ring
- Confirmed prevention of bacterial entry of 84 % compared to other implant systems[21]
- Supports long-term health of the peri-implant soft tissue



Color-coding and packaging

Easy handling: FRIADENT color-coding since 1993

A comprehensive color-coding system was developed in 1993 to simplify handling of components and instruments and also to simplify documentation. A color is assigned to every implant diameter. The same color is also used on all implant packaging and diameter-specific instruments and abutments. Titanium components are color-coded by controlled anodic oxidation of the titanium surface. The color comes from absorption of the light wavelength that corresponds to the thickness of the layer.

The diameters of the FRIALIT®-2 system match the following colors:

- **D 3.4 = silber**
- **D 3.8 = yellow**
- **D 4.5 = blue**
- **D 5.5 = red**
- **D 6.5 = green**

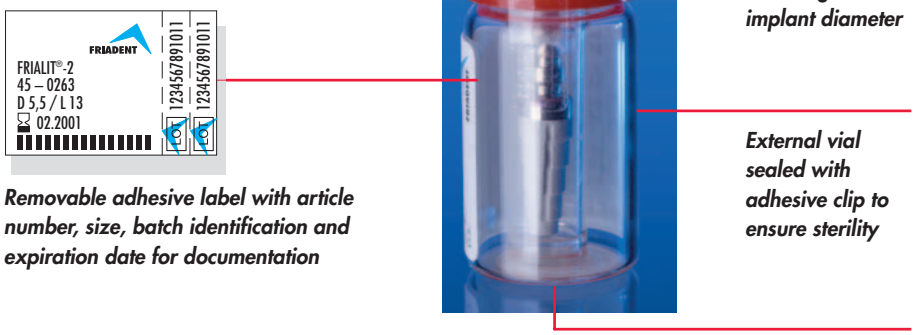
Different parts of the various components are color-coded depending on their application. The color-coding on system components that remain in the mouth is not visible when the component is in its final position.

FRIALIT®-2 colors provide

- **Clear identification of the implant diameter**
- **Easy assignment of implant components**
- **Safe documentation**
- **Biocompatibility and resistance to the oral environment**

The implant packaging

- Gamma-sterilized, sealed double vial
- Transparent external vials for immediate recognition of the contents



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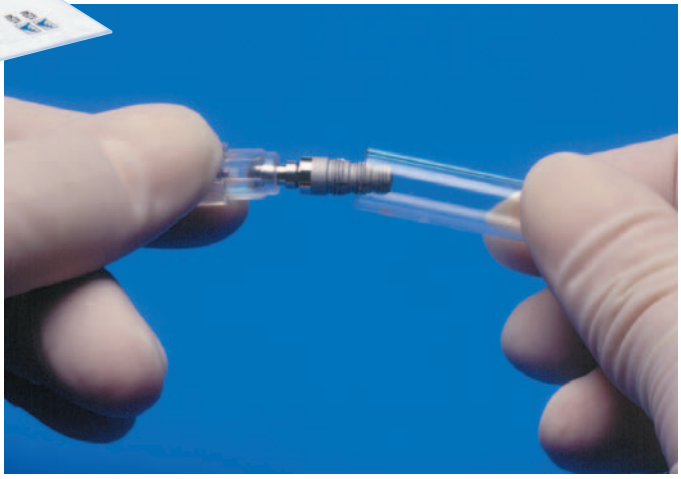
Did you know?
Do you know what the legally required, internationally standardized symbols for language-independent product information on the new FRIADENT labels mean?

STERILE R	*Sterilization by radiation*
	Not to be re-used
	Use by
	Caution – observe directions for use
LOT	*Batch code*
CE 0123	*CE mark*

Color-coding and packaging

No-touch implant removal

The FRIADENT packaging system meets the stringent requirements for international approvals and offers the user assistance and the maximum possible safety during storage, use, and documentation.



The following table lists the components of the packaging and their functions:

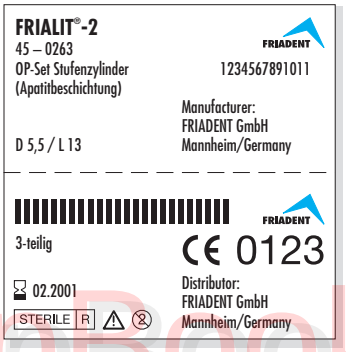
Component	Function
External cardboard packaging	Holder of product and information
Sealing strip	Sterility check
External vial with cover (sterile content)	Diameter identification and Sterility barrier
Sterilization indicator	Sterilization confirmation
Removable label	Product identity for patient record and files
Inner vial with silicone stopper (sterile inner vial and contents)	Fixing the implant; contamination-free handling of the cover screw

Intelligently packaged for safe delivery of the implant

- **Color-coded cap with implant length for clear identification**
- **Transparent outer vial for visual check of implant**
- **Sterilization indicator on the bottom of the vial for validation of sterilization**
- **Sterile inner container with implant holder stopper for fast, safe and no-touch removal of implants**
- **Removable labels with batch number on the outer vial for simple documentation**

The blister

Transparent blister with removable label for optimum protection of our components



The label

Outer packaging sealed with a label, which contains all important product-specific information. Symbols show information on sterility, re-usability, expiration date, safety notes, batch identification, and CE mark of the product.

Product information

Environmentally friendly and recyclable external packaging for blister packaging with detailed product information

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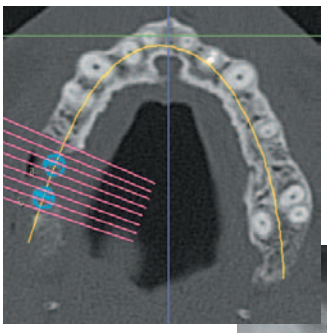
Planning

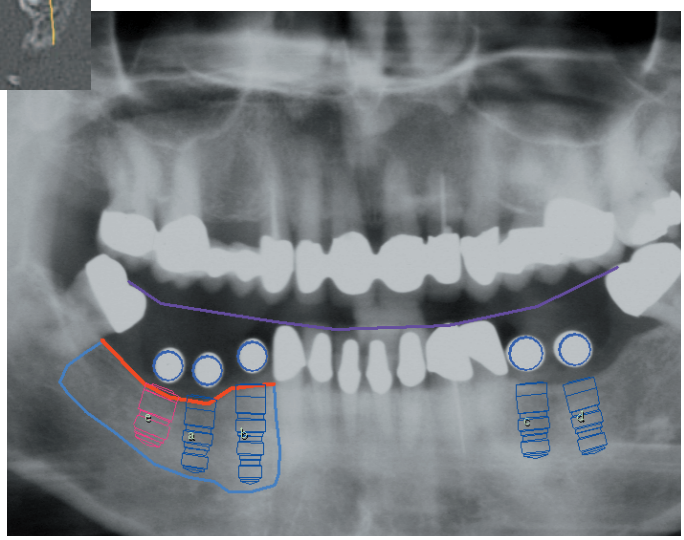
Planning must include all measures and show alternatives suited for meeting the expectations of the patient with respect to function and esthetics of implant-prosthetic rehabilitation.

Planning includes the following components:

I. Pre-prosthetic planning
II. Surgical planning
III. Scheduling
IV. Cost planning

The planning is based on a complete record of the general and specific medical history and intraoral diagnosis with analysis of the initial anatomical situation.
Aspects of pre-prosthetic and surgical planning interact directly with each other. Every change of pre-prosthetic planning affects the surgical planning and vice versa.
This includes determining the number, diameter, lengths, position and alignment of the implants.
A treatment plan, schedule and free estimate are also prepared.



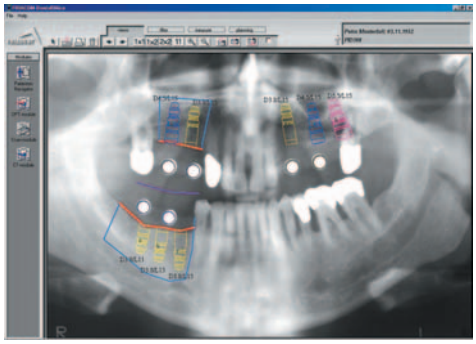


Use of the FRIACOM® CT and OPG modules

FRIACOM®: The modular software concept

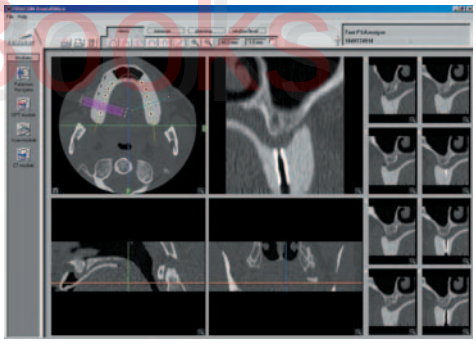
With FRIACOM® DentalOffice® FRIADENT offers a complete computer-supported solution for simplifying this complex process.
Depending on the available computer system and radiographic equipment in the practice, the relevant modular solution offers a specific computer program and a scanner as an option. FRIACOM® DentalOffice® is supplied in three modules for different purposes and can be upgraded to meet different requirements.

The FRIACOM® OPG module



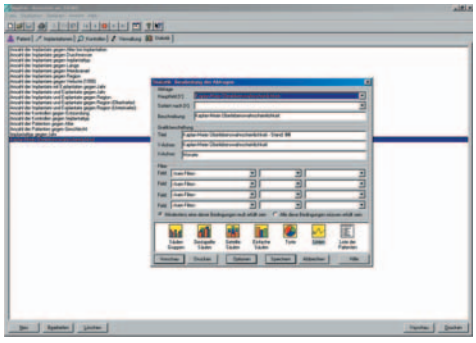
- Digital processing of scanned radiographic images, or import of primary digital images with contrast optimization, and dynamic adaptation for optimum evaluation.
- Measurement and implant-prosthetic planning on the OPG or dental film
- Documentation of planning results and printout for the patient
- Forwards the plan to the restorative dentist or laboratory technician

The FRIACOM® CT module



- Enhancement of diagnostic information provided by the two-dimensional OPG with a three-dimensional view by analysis of the cross-sectional images on real-time CT data
- Evaluation of the vertical and horizontal bone volume
- Assessment of bone quality
- Optimum planning of the implant position and direction in all spatial dimensions
- Assessment of any possible complications during the operation

FRIACOM® ImpDat

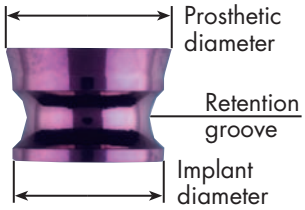


- Software for documenting the implantological treatment plan
- Automatic recall system for complete treatment control
- Easy statistical evaluation

The FRIACOM® modules enable the practitioner to do the diagnosis, planning and documentation quickly, easily and safely.

The printed documentation can be used for patient education and archiving.

DropBooks



FRIADENT Select: Predictable esthetics due to pre-prosthetic planning

FRIADENT Select sleeves

The color-coded FRIADENT Select sleeves are available for each implant diameter and are used to transfer the pre-prosthetic planning to the surgical stent. They are 4 mm high and are made of titanium.
One side of the sleeve matches the implant diameter and the opposite side matches the flare of the abutment.

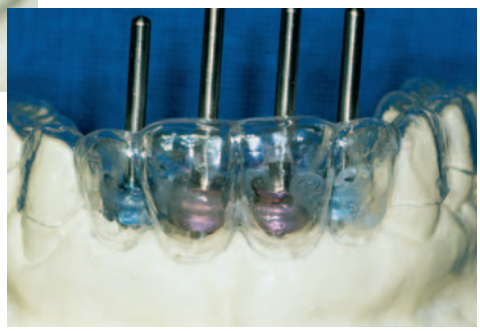
Prosthetic diameter	4.2 mm	4.8 mm	5.2 mm	5.9 mm	6.9 mm
Implant diameter	D 3.4	D 3.8	D 4.5	D 5.5	D 6.5

A 2 mm high circular retention groove is machined in the FRIADENT Select sleeves to securely anchor them in the surgical template.
The FRIADENT Select guide pins (D 2.0 mm) can be positioned in the study model after drilling a 2.0 mm pilot hole in the proposed site.
Finally, the implant diameter is selected with the FRIADENT Select sleeves. The position and the horizontal distance are checked and the pilot hole is corrected if necessary. The sleeves are then polymerized into the surgical stent.

FRIADENT Select sleeves for pre-prosthetic planning

- **Determination of the implant diameter and position from anatomical, surgical and esthetic aspects**
- **Consideration of the flare of the abutment**
- **Optimum interproximal space in the vertical and horizontal dimension for reconstruction of the papilla**

Determination of the implant diameters and locations with regard to the surgical and prosthetic space requirement using the FRIADENT Select guide pins and sleeves



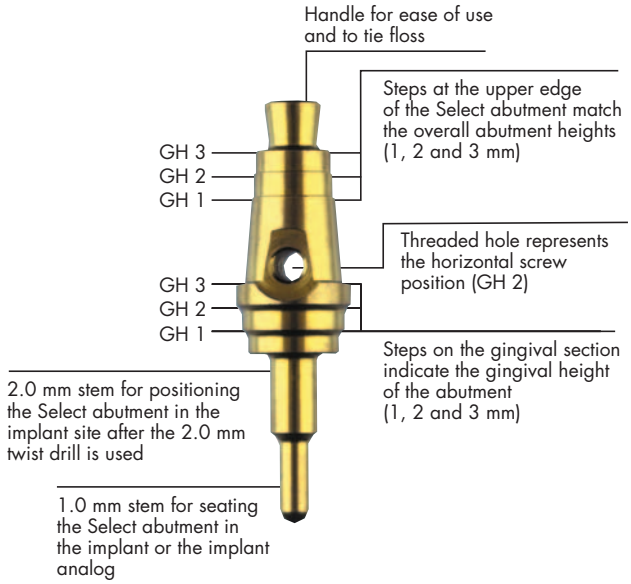
Vacuum-formed stent to transfer the planned implant location to the surgical site

Once the surgical and prosthetic "ideal implant diameter" and the horizontal distance between the implants have been determined, the FRIADENT Select sleeves are finally polymerized into the stent. The planned implant location is transferred by guiding the 2.0 mm pilot drill through the positioned surgical stent during the surgery.

FRIADENT Select abutments

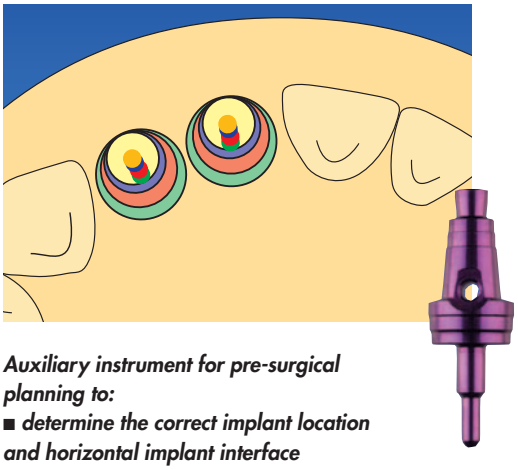
FRIADENT Select abutments simplify pre-surgical planning by determining the suitable implant abutment with the optimum interproximal distance. There is a 7 mm long guide pin with a diameter of 2 mm for placement in the pilot hole at the base of the FRIADENT Select abutment. After 3.5 mm, the diameter of the pin is reduced to 1 mm. This allows the Select abutment to be positioned in the implant and in the laboratory analog. The pin does not have a hex, so it can be used to check the pilot hole during implant site preparation. The position of the hex can be determined using the horizontal hole. At the base of the abutment, there are step markings for evaluation of the gingival height (GH 1, GH 2, GH 3). They are repeated at the upper edge of the abutment to show the overall height based on the required gingival margin.

DropBooks

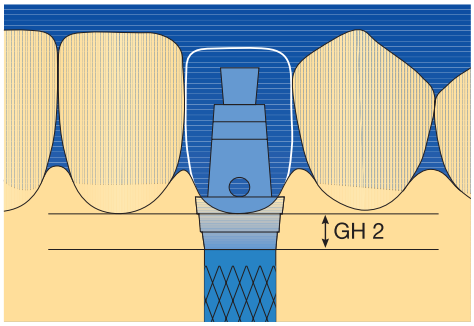


Planning

The FRIADENT Select abutments are used during pre-surgical planning to determine the implant diameter, implant location and interproximal spacing.

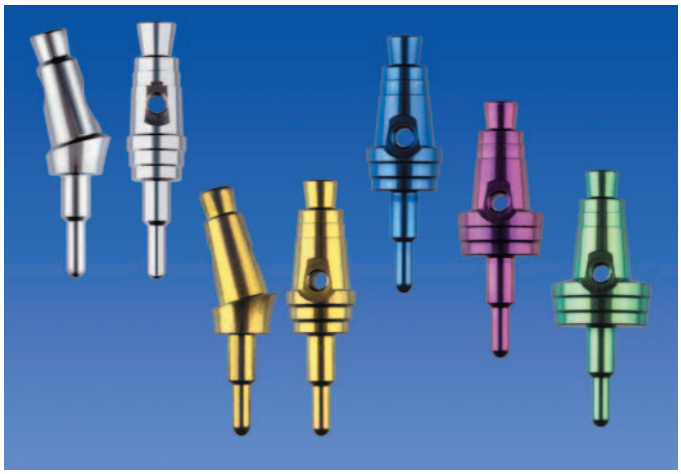


Auxiliary instrument for pre-surgical planning to:
- *determine the correct implant location and horizontal implant interface*
- *check the labial-lingual and mesial-distal position with the FRIADENT Select abutments*



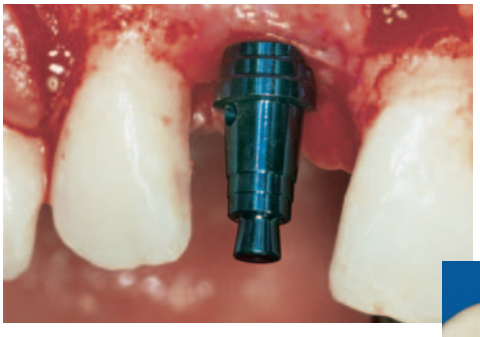
- *determine the height of the gingival margin and the location of the horizontal screw*

Simple, reproducible planning and verification are the basis for predictable functional and esthetic results.
FRIADENT Select abutments of pure titanium also have the FRIADENT color-coding and are available in 3.4 – 6.5 mm diameters.

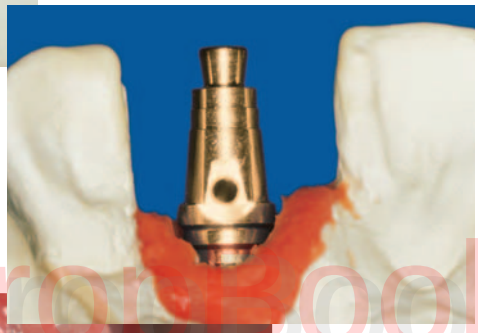


FRIADENT Select abutments

Angled try-in abutments in 3.4 and 3.8 mm diameters are also available for pre-prosthetic planning.
During clinical use, the FRIADENT Select abutments can be secured with dental floss through the prefabricated hole, which shows the location of the horizontal retaining screw for the 2.0 mm gingival height abutment.



Surgical aid after the 2.0 mm pilot hole



Selection guide in the laboratory

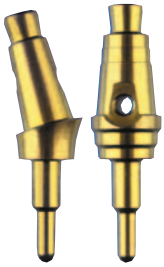
Securing the FRIADENT Select abutments with dental floss

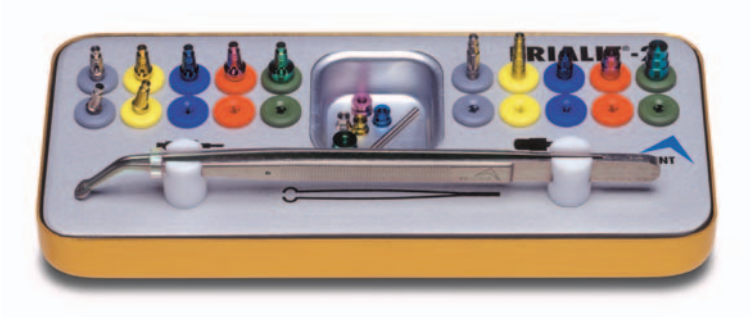
DropBooks

Planning

FRIADENT Select abutments

- Used on the study model and during surgery
- Available in the straight version for all implant diameters and in the angled version for implant diameters 3.4 and 3.8 mm
- Color-coding by diameter
- Stepped markings to determine the appropriate gingival height
- Corresponding markings for identification of the overall occlusal height
- Without hex – for use on the study model and during surgery
- Can be positioned in the pilot hole and in the implant or laboratory analog
- Hole to determine the location of the horizontal retaining screw
- Easy and secure insertion with the handle on the top of the abutment
- FRIADENT Select tray for storage and sterilization





Extraction

FRIADENT periotome: Atraumatic extraction

For immediate implant placement, extreme care is required during tooth extraction to protect the thin labial/buccal plate. The **FRIADENT periotome** is ideally suited for atraumatic removal of residual roots and teeth.

The **FRIADENT periotome** is a two-part instrument, comprising a 15 cm long handle and an ergonomically shaped grip for safe handling. There is a mandrel at its tip for antirotation locking of the periotome blades. Three flexible blades are available, depending on the position and the root shape of the tooth to be extracted.

Blade P1	straight	16 mm long	0.8 mm thick	2.7 mm wide
Blade P2	straight	12 mm long	0.6 mm thick	1.8 mm wide
Blade P3	angled	12 mm long	0.4 mm thick	1.4 mm wide

DropBooks

The flexibility of the periotome blades resulting from their shape and material (stainless steel alloy) allows the periodontal ligament to be cut cleanly because of their adaptation to the alveolar bone and root contour.
The blades can be changed quickly and easily.

FRIADENT periotome

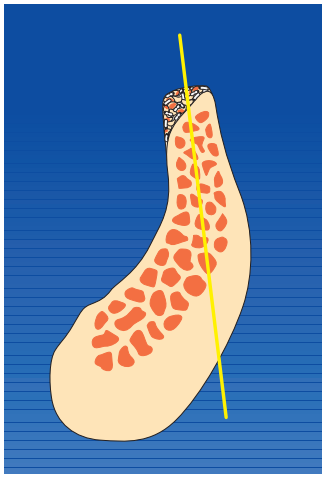
- **Protection of the facial plate**
- **Atraumatic severing of the periodontal ligament**
- **Optimum flexibility with three different blades**
- **For all indications due to flexible blades**

Caution: Replace bent blades!

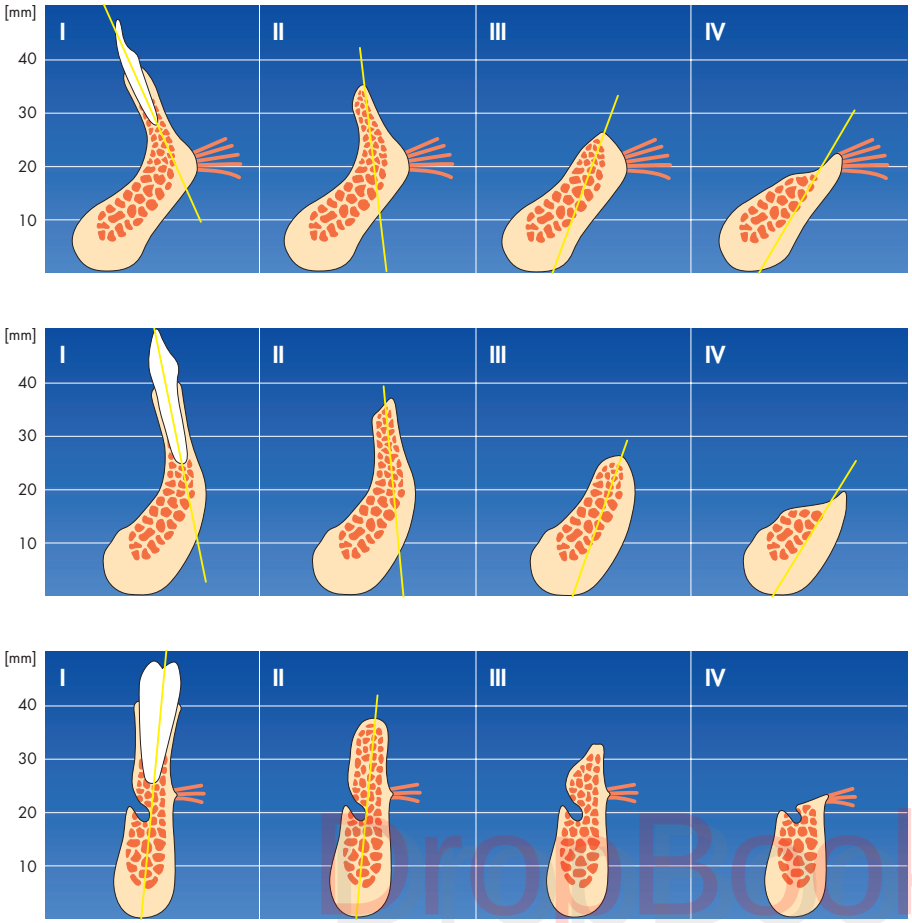
Bone quantity

The functional loading of the natural tooth stimulates and supports the surrounding alveolar bone. Tooth loss also means the loss of this physiological loading, which initiates a rapidly progressing bone atrophy. In addition, the density of the remaining bone is reduced. The advanced atrophy of the alveolar ridge leads to an increasing interarch incongruence both in the distance and the angle between the jaw and the prosthetic axis (see page 45). With advanced vertical atrophy, the upper edge of the ridge becomes more and more distant from the occlusion plane, which changes the clinical crown to implant ratio. This atrophy also affects the angle of the implant axis and results in defects of the soft tissue. In severe cases, a fixed restoration can often not be utilized even with augmentation.

Early studies by Schulte *et al.*[1], over more than 25 years, show that root-analog implants support and retain hard and soft tissue and can lead to a functional and esthetic result.
If the bone volume is insufficient, the ridge should be improved with appropriate surgical procedures. Examples of reconstructive measures include bone splitting, guided bone regeneration, grafting and distraction osteogenesis. Procedures to allow placement of longer implants include sinus floor elevation and nerve transposition.



Augmentation in the facial region with bone grafting material

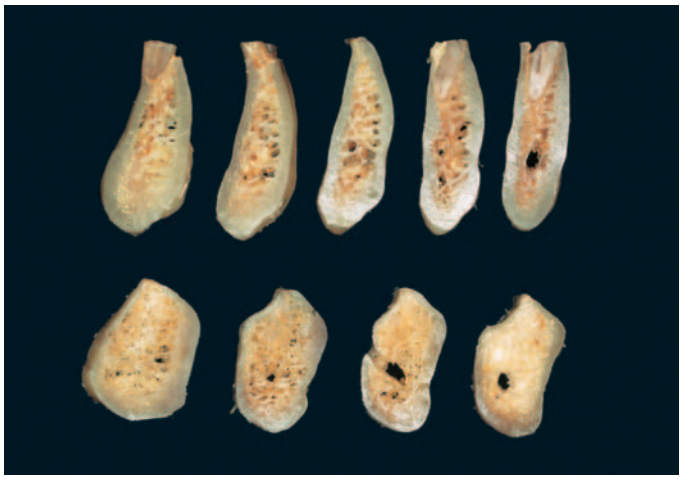


DropBooks

Resorption stages of the edentulous mandible per J. I. Cawood[45] and resulting changes to the implant axis.

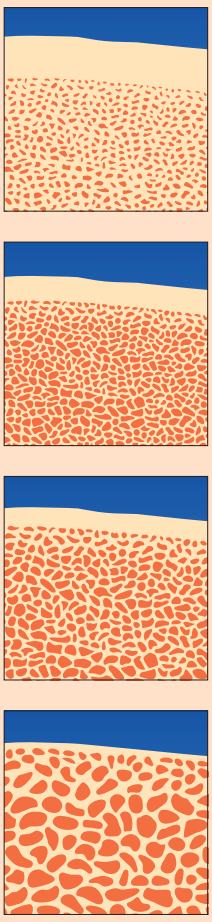
Bone quality

The bone quality can vary greatly in different regions of the maxilla and mandible. The bone in the anterior region of the mandible is generally very hard and cortical, while the bone in the posterior maxilla tends to be soft and spongy.
The density of the spongiosa can be clinically assessed by the implant pilot hole. It can often be estimated on the orthopantomograph (OPG) and the CAT scans. It generally decreases from the anterior to the posterior. Bone with high density ensures increased primary stability and quick, complete bone growth on the implant surface.



Change of bone structure and quality in the mental spine region to the mental foramen region.

Age-related changes, radiation therapy and metabolic diseases, such as diabetes mellitus or osteoporosis, can alter the bone structure and reduce the osteogenetic repair potential. The bone also changes as a result of the change in load distribution after loss of teeth.
The preparation technique must take the bone quality at the implant location into account if primary stability is to be assured. According to Misch et al.[9] and Lekholm and Zarb[46], bone can be classified into different quality classes (see graph page 47).
Classes D I to D IV generally describe the ratio of compact to spongy bone. While bone class D I almost exclusively represents compact cortical bone, class D IV covers less dense spongy bone with thin cortical bone.



Bone class D I

Dense compact bone, little spongy bone

Bone class D II

Dense compact bone, large-grain spongy bone

Bone class D III

Thin compact bone, fine-meshed spongy bone

Bone class D IV

No compact bone, fine spongy bone

DropBooks

Classification of bone after C. Misch et al.[9] and U. Lekholm and G. A. Zarb[46]

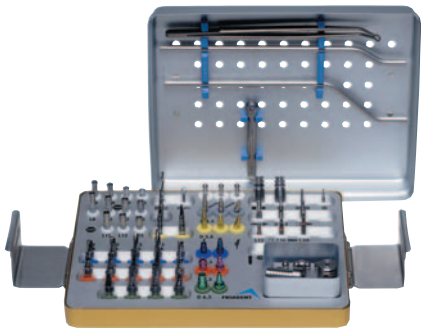
Instruments/surgical tray

The FRIALIT®-2 surgical tray – Concise and well-organized

The instruments for surgical application of the FRIALIT®-2 system are organized in a surgical tray according to their sequence of use.

The FRIALIT®-2 surgical tray is half the size of a standard tray:

Width	Length	Height
19 cm	14 cm	4 cm



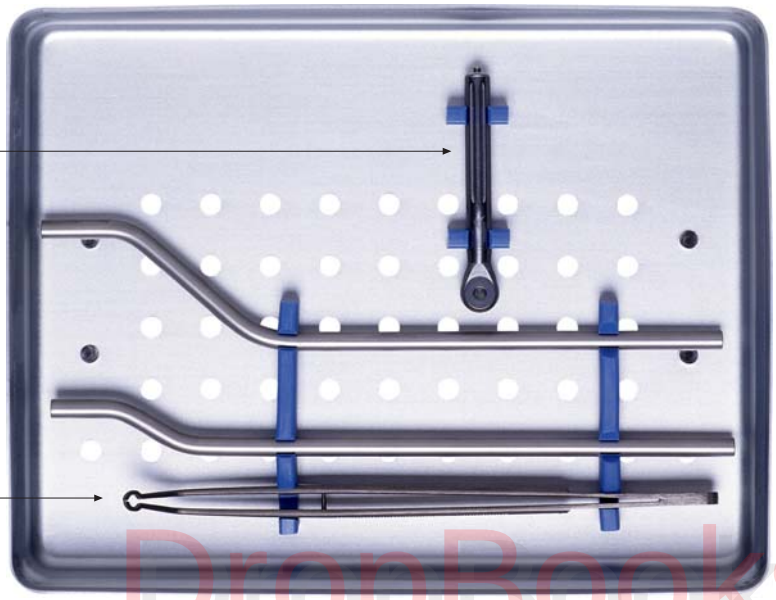
The cover and base of the FRIALIT®-2 surgical tray are manufactured of aluminum and are perforated for sterilization. The cover is secured with solid clamps and has silicone holders for the seating instruments, the implant forceps and the FRIADENT ratchet. The aluminum tray insert has color-coded silicone holders to hold the instruments and components securely in place. The aluminum tray (5 x 4 cm) with a stainless steel drill stand can be removed separately and used to hold the drills in the ultrasonic bath.

The instruments are clearly arranged in sequence of use to ensure smooth surgical procedures. Besides the implant specific drills for preparation of the implant site, the FRIALIT®-2 surgical tray contains the cortical drills, implant drivers for the ratchet and handpiece, and screwdrivers.
The FRIADENT Select abutments and try-in implants are secured in color-coded silicone holders.
The FRIALIT®-2 surgical tray also includes depth gauges 1.8 mm in diameter with implant length markings of 8, 10, 11, 13 and 15 mm.
The removable depth stops for the FRIALIT®-2 diameter 2.0 – 3.8 drills are arranged on special silicone stoppers.

The FRIALIT®-2 surgical tray – compact and well-organized

- **Logical arrangement of the instruments in their order of use**
- **Silicone holders with FRIADENT color-coding**
- **Stable holder for instruments**
- **Sealing clamps for safe transport**
- **Sterilization by autoclave, hot air or chemiclave**
- **Separate, removable drill stand**

Components of the FRIALIT®-2 StarterSet for surgery and upgrade to the ExpertSet



Ratchet

Implant Tweezers

Posterior Seating Instrument for Stepped Cylinder

Standard Seating Instrument for Stepped Cylinder

DropBooks

57 Twist drill D 2.0
58 Round drill D 3.8
59 Stepped drill D 3.4
60 Stepped drill D 3.8
61 Cortical drill D 3.8

54 – 56 Depth gauge D 2.0

Depth stop D 2.0
1 L 8
2 L 10
3 L 13
4 L 15

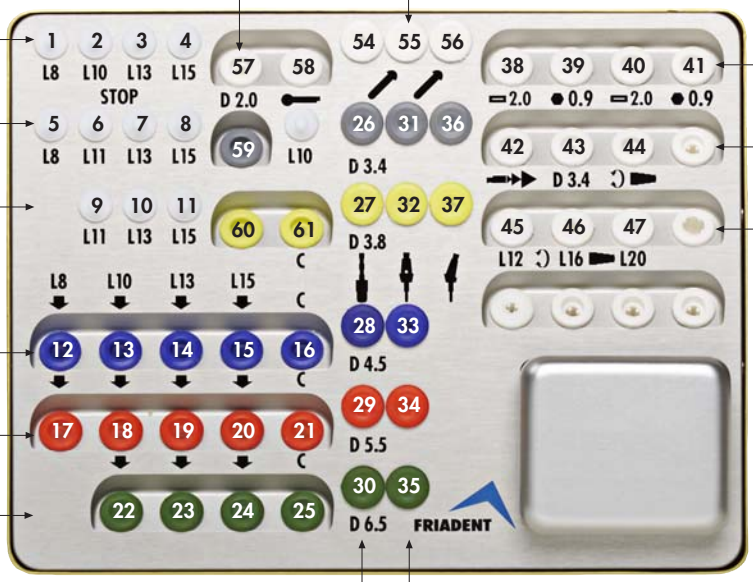
Depth stop D 3.4
5 L 8
6 L 11
7 L 13
8 L 15

Depth stop D 3.8
9 L 11
10 L 13
11 L 15

Stepped drill D 4.5
12 L 8
13 L 10
14 L 13
15 L 15
16 Cortical drill D 4.5

Stepped drill D 5.5
17 L 8
18 L 10
19 L 13
20 L 15
21 Cortical drill D 5.5

Stepped drill D 6.5
22 L 10
23 L 13
24 L 15
25 Cortical drill D 6.5



Screwdriver
38 Ratchet, blade 2.0
39 Ratchet, hex 0.9
40 Contra-angle, blade 2.0
41 Contra-angle, hex 0.9

42 Drill shaft extension
43 Implant driver contra-angle
44 Implant driver contra-angle

Implant Driver for Ratchet
45 L 12
46 L 16
47 L 20

Select Try-In Implant
26 D 3.4
27 D 3.8
28 D 4.5
29 D 5.5
30 D 6.5

Select Try-In Abutment
31 D 3.4 / A 0 (straight)
32 D 3.8 / A 0 (straight)
33 D 4.5 / A 0 (straight)
34 D 5.5 / A 0 (straight)
35 D 6.5 / A 0 (straight)
36 D 3.4 / A 15 (angled 15°)
37 D 3.8 / A 15 (angled 15°)

Rotary preparation

Rotary preparation of the implant site Ablative method

FRIALIT®-2 twist drill and stepped drills – precise and atraumatic
The prerequisite for a successful implant is the precise and atraumatic preparation of the implant site.

The FRIALIT®-2 instruments for rotary implant site preparation:				
Twist drill D 2.0	universal (8 –15 long)			
Round drill	universal (8 –15 long)			
Stepped drills D 3.4	universal (8 –15 long)			
Stepped drills D 3.8	universal (8 –15 long)			
Stepped drills D 4.5	L 8	L 10	L 13	L 15
Stepped drills D 5.5	L 8	L 10	L 13	L 15
Stepped drills D 6.5		L 10	L 13	L 15

All drills and depth stops are labeled with the diameter and length for ease of identification.
The 2.0 diameter pilot twist drill and the 3.4 – 3.8 mm diameter stepped drills (universal) required for preparation of the implant site have four cutting edges, are manufactured of corrosion-free steel, can be sterilized and have length marks of 8, 10, 11, 13 and 15 mm.
The stepped drills D 4.5/L 8 – D 6.5/L 15 are designed to match the implant size. The depth stops are pre-mounted and can be removed with a tool included in the tray.
The cutting efficiency, irrigation and chip removal of the FRIALIT®-2 stepped drills allow atraumatic and precise preparation of the implant site.

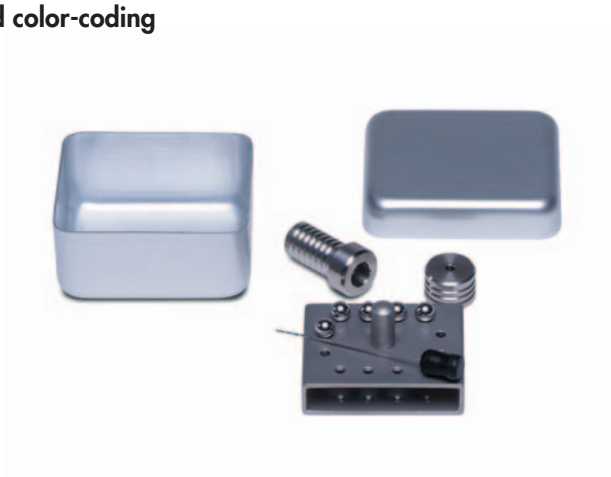
All drills have a standard latch connection for contra-angle handpieces with a 2.35 mm drill shaft and have efficient internal irrigation.
The irrigation medium exits from the ports on both sides of the drill tip.
The tray includes a cleaning instrument for drills (diameter 0.7 mm, stainless steel with metal handle) to be used for thorough cleaning and clearing of the internal irrigation of the drill. After cleaning the irrigation channel and ports with the cleaning needle, the drills should be sterilized in the FRIALIT®-2 surgical tray in accordance with the directives (up to 20 times, depending on the bone quality; see Sterilization Manual).

The drill depth stop tool for easy mounting and removing of depth stops

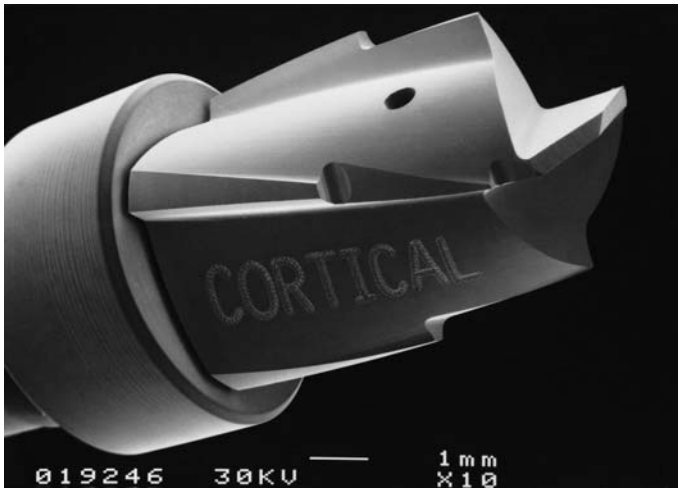
DropBooks

FRIALIT®-2 drills – precise preparation

- **Exact match of the implant and drill geometry**
- **Efficient internal irrigation of all FRIALIT®-2 drills to prevent overheating of the bone or bone necroses**
- **Precise preparation with depth marks and removable depth stops**
- **Flexibility during surgery with removable depth stops**
- **Clear drill arrangement with diameter-oriented color-coding**
- **For diameter D 4.5 to 6.5 mm drills, option of drilling 1 mm deeper by lifting of the depth stop without removal**



Rotary preparation



FRIALIT®-2 cortical drill: For use in "hard cases"

Hard cortical bone frequently exhibits elastic resilience after preparation of the implant site. This can be compensated with additional preparation of the upper step with the FRIALIT®-2 cortical drill.
Its geometry matches the corresponding stepped milling tool for the implant length of 8 mm, but the diameter of the top step is increased by 0.1 mm (0.2 mm at D 6.5). FRIALIT®-2 cortical drills are available in 3.8 – 6.5 mm diameter.

Advantages of the FRIALIT®-2 cortical drill

- **Atraumatic widening of the implant bed only where necessary – drill diameter is enlarged by 0.1 mm at the first step**
- **Compensation for the resilience of the bone – implant can be inserted without difficulty even in extremely thick cortical bone**
- **Reduced friction with cylindrical implants in the crestal region**
- **Less stress on the cortical bone during insertion of the implant**

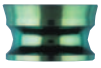
FRIADENT Select: Predictable esthetics through guides during surgery

FRIADENT Select sleeves **see page 38**

FRIADENT Select sleeves are used for exact transfer of the pre-prosthetic planning to the surgical site.
FRIADENT Select sleeves act as guides for the 2.0 mm twist drill for precise control of the implant position and angulation during surgery.

Advantages of the FRIADENT Select sleeves

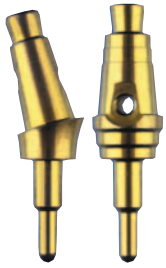
- **Simple transfer of the best implant position for the prosthesis to the surgical stent**
- **Determination of the implant diameter and position from anatomical and esthetic aspects**
- **Optimum control of the interproximal space between the implants in the vertical and horizontal dimensions**



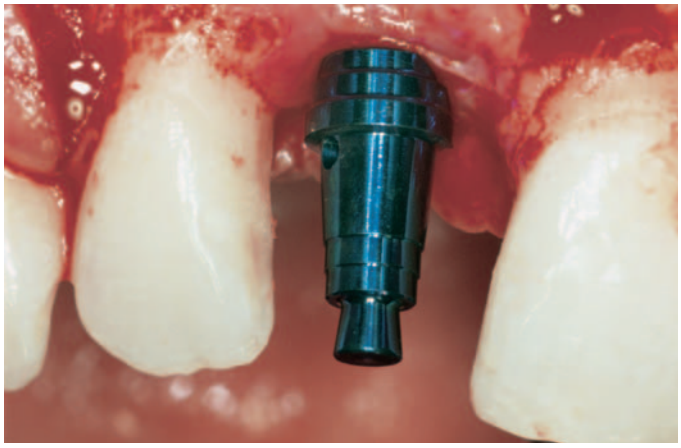
DropBooks

FRIADENT Select abutments **see page 39**

FRIADENT Select abutments simplify the process of selecting the optimum implant diameter during surgery. They can also be used in the implant and in the laboratory analog.
The gingival height (GH 1, GH 2, GH 3) can be read from the step graduations. This also provides information on the occlusal height, depending on the required gingival height.
The FRIADENT Select abutment has a hole to show the height of the horizontal retaining screw. Floss can be threaded through this hole for use intraorally.
There is also a handle on the top of the FRIADENT Select abutment.



Rotary preparation

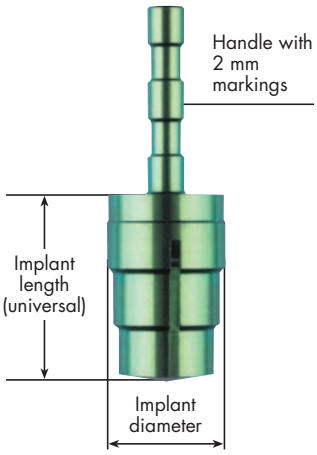


Control of pilot hole during surgery

Because the dimensions of the try-in abutments match the flare of the prosthetic abutments, the facial-palatal position, mesial-distal position, and the distance to the adjacent implants or teeth can be verified after the pilot hole has been drilled.
Functional and esthetic long-term results become predictable on the basis of simple and reproducible planning and spacing concepts.
FRIADENT Select abutments of pure titanium have the FRIADENT color-coding and are available in the straight version in diameters of 3.4 – 6.5 mm.
FRIADENT Select abutments come without a hex for use during surgery. After the pilot hole has been drilled, the sterilized try-in abutments are positioned. The implant position, the horizontal spacing and the axial inclination are verified. Angled FRIADENT Select abutments in 3.4 and 3.8 mm diameters are used to check the angulation.

Advantages of the FRIADENT Select abutments

- **Guide pin for placement in the pilot hole, in the implant or laboratory implant**
- **Checking the space available to the adjacent tooth or implant**
- **Stepped markings to determine the gingival height**
- **Corresponding identification markings for the occlusal height**
- **Use on the study model and during the surgery**
- **Predrilled hole for the horizontal retaining screws and marking of the hex position**
- **Easy and secure insertion with the handle**
- **Easy identification of the implant diameter with the color-coding**
- **Can be sterilized in the FRIADENT Select tray**



FRIALIT®-2 Select try-in implants

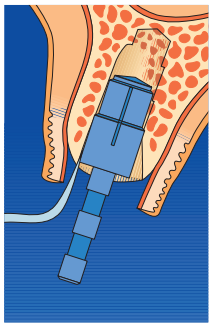
FRIALIT®-2 Select try-in implants offer quick and easy in-process control during the critical phase of surgical preparation of the implant site. They are used during surgery to check the depth and the relationship of the crestal edge/ dimension of the osteotomy with the planned implant diameter. If the FRIALIT®-2 try-in implant is subjected to strong friction when placed in the osteotomy, the FRIALIT®-2 cortical drill is recommended to open the cortical bone.

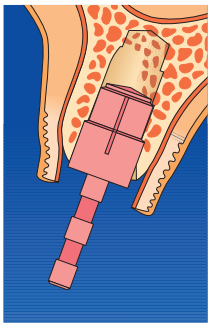
FRIALIT®-2 Select try-in implants are manufactured of titanium and correspond to the FRIALIT®-2 implant design. They are available in five color-coded diameters from 3.4 to 6.5 mm in the length of the shortest implant of that diameter. The spacers on the steps allow the preparation depth to be checked for other implant lengths as well. The try-in implants have a 10 mm handle with 2.0 mm graduations to determine the thickness of the soft tissue.

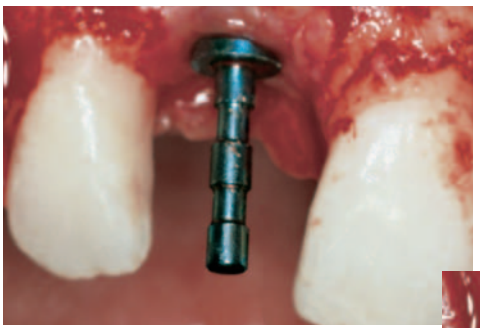
Advantages of the FRIALIT®-2 try-in implants

- **Easy verification of position and axial direction**
- **Verification of the top of the implant and the crest of the bone**
- **Determining soft tissue thickness**
- **Orientation aid during immediate implantation**
- **Check of future implant fit and friction**
- **Sterilizable in the FRIADENT Select tray**
- **Indicator for FRIALIT®-2 cortical drill**

DropBooks







Osteotome preparation

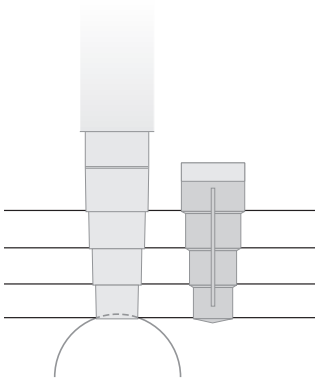
Osteotome preparation of the implant site Non-ablative methods

FRIALIT®-2 BoneCondenser: Condense instead of drilling

Bone quantity and bone quality

see page 44/46

Depending on the region, the bone quality can be very different. The mandible is mostly very hard cortical bone while the maxillary bone tends to be soft and spongy. In addition, the bone height in the lateral maxillary region is often insufficient because of atrophy of the ridge and/or low sinuses.



The alternative: Bone Condensing

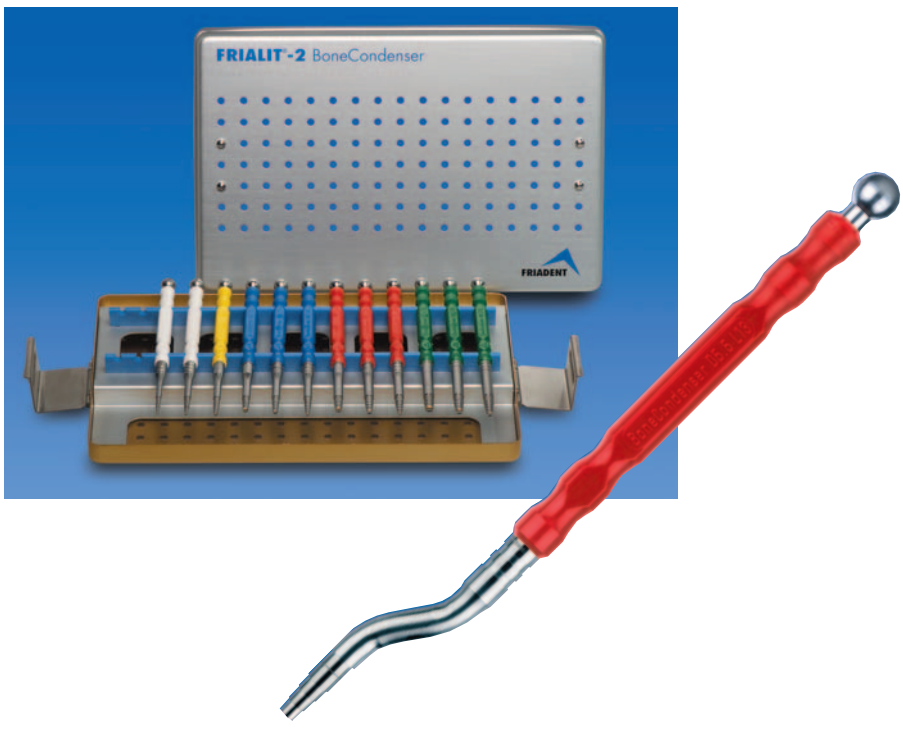
It is not always possible to insert an implant with sufficient primary stability in Type III or IV bone. In such cases, preparation of the implant bed by condensation of the bone can optimize the conditions for implantation. Apical and lateral condensation

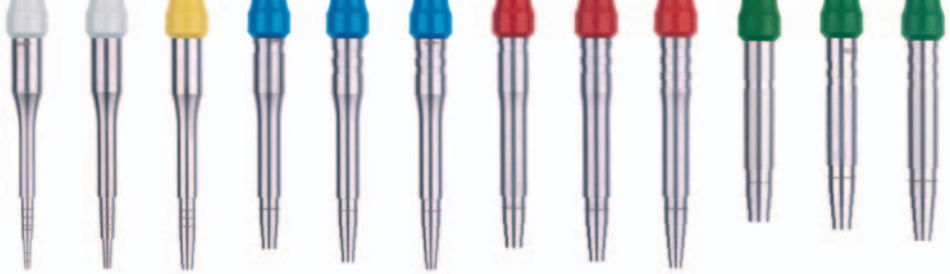
- Improves the bone structure
- Improves osseointegration of the implant
- Enhances the osteoconductive properties of the bone[22–25].

A special set of osteotomy instruments specially designed for the stepped geometry of the FRIALIT®-2 implant is available for this technique.

The FRIALIT®-2 BoneCondensers are a conservative alternative to conventional surgical methods in cases where implants are to be inserted into weak, spongy bone.

FRIALIT®-2 BoneCondensers condense and improve the mechanical stability of the bone.[22–25]



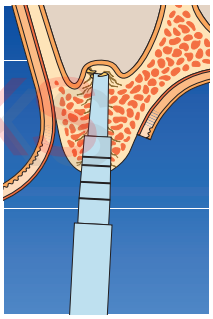


The working end of surgical stainless steel matches the FRIALIT®-2 implant design in shape and length and has a sharp concave tip. Directly below the plastic handle are grooves for identifying the length (1 ring = 10 mm, 2 rings = 13 mm, 3 rings = 15 mm). The tip has a mark to indicate the depth of insertion and a safety stop.

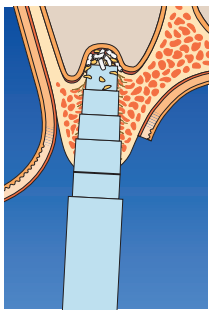
The 2 mm and 3 mm diameter are marked at 2 mm and 4 mm for use in the sinus region.
A handle approximately 9 cm long of sterilizable plastic with the FRIADENT color-coding is ergonomically shaped. The spherical metallic striking head has a diameter of 10 mm.
The FRIALIT®-2 BoneCondenser Set includes 12 single instruments stored in a sterilizable tray. The logical arrangement allows the tray to be used during surgery in order of use.

	D 2.0	D 3.0	D 3.8	D 4.5	D 5.5	D 6.5
Universal	■	■	■			
L 10				■	■	■
L 13				■	■	■
L 15				■	■	■

The FRIALIT®-2 BoneCondensers in diameters of 2.0, 3.0 and 3.8 mm are universally applicable for all lengths. One instrument each per implant length is available for diameters of 4.5 – 6.5 mm. Angled FRIALIT®-2 BoneCondensers are also available for use in the posterior. The angulation offsets the working tip approximately 1 cm from the handle. Otherwise, the instruments correspond to the straight FRIALIT®-2 BoneCondenser Set.



All instruments should be replaced when they become blunt or damaged and after no more than 20 uses. Thorough and careful disinfection and cleaning of the FRIALIT®-2 BoneCondensers guarantees optimum function.

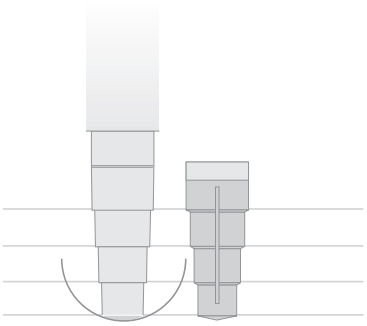


DropBook

Advantages of the FRIALIT®-2 BoneCondensers

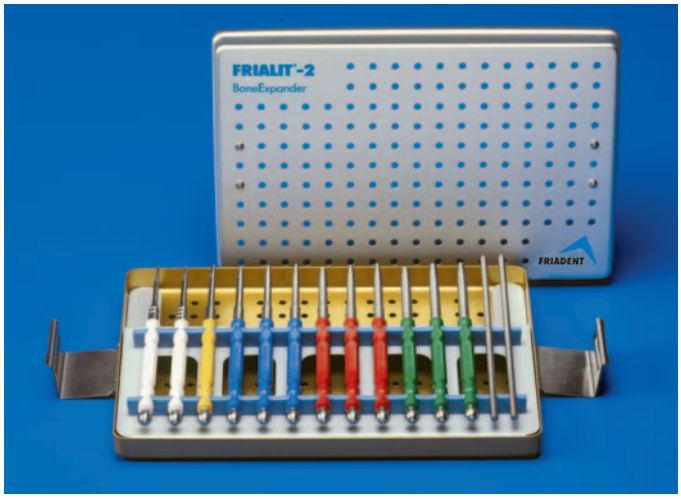
- **With reduced bone quality: preparation of the implant site by condensation instead of drilling**
- **With insufficient bone height: local lifting of the sinus floor for insertion of longer implants**
- **With reduced bone quantity: improved stabilization of the implants through condensation**

Osteotome preparation



FRIALIT®-2 BoneExpander: Expansion for improved retention

The concept of root-analog, anatomically-shaped implants in combination with local spreading of the alveolar ridge allows the use of larger diameter implants. This offers significantly improved peri-implant distribution of forces with excellent soft tissue support. The use of the split thickness flap technique and stabilization of the bone by maintaining the periosteal cover makes use of the secondary healing of the tissue. The concept of the ERE* and LMSF** techniques has been scientifically studied and documented by Bruschi and Scipioni since 1988.[27–30]



The FRIALIT®-2 BoneExpanders, specially matched to the FRIALIT®-2 stepped design, were specifically developed for these techniques.
FRIALIT®-2 BoneExpanders have a working tip of surgical stainless steel with marker grooves for the implant length, a line for the insertion depth, and a safety stop for easy and safe handling. The working end matches the FRIALIT®-2 implant design in shape and length and has a convex tip. The color-coded handle is ergonomically shaped.
The FRIALIT®-2 BoneExpander Set includes 12 single instruments stored in a sterilizable tray. The logical arrangement allows the tray to be used during surgery in order of use.

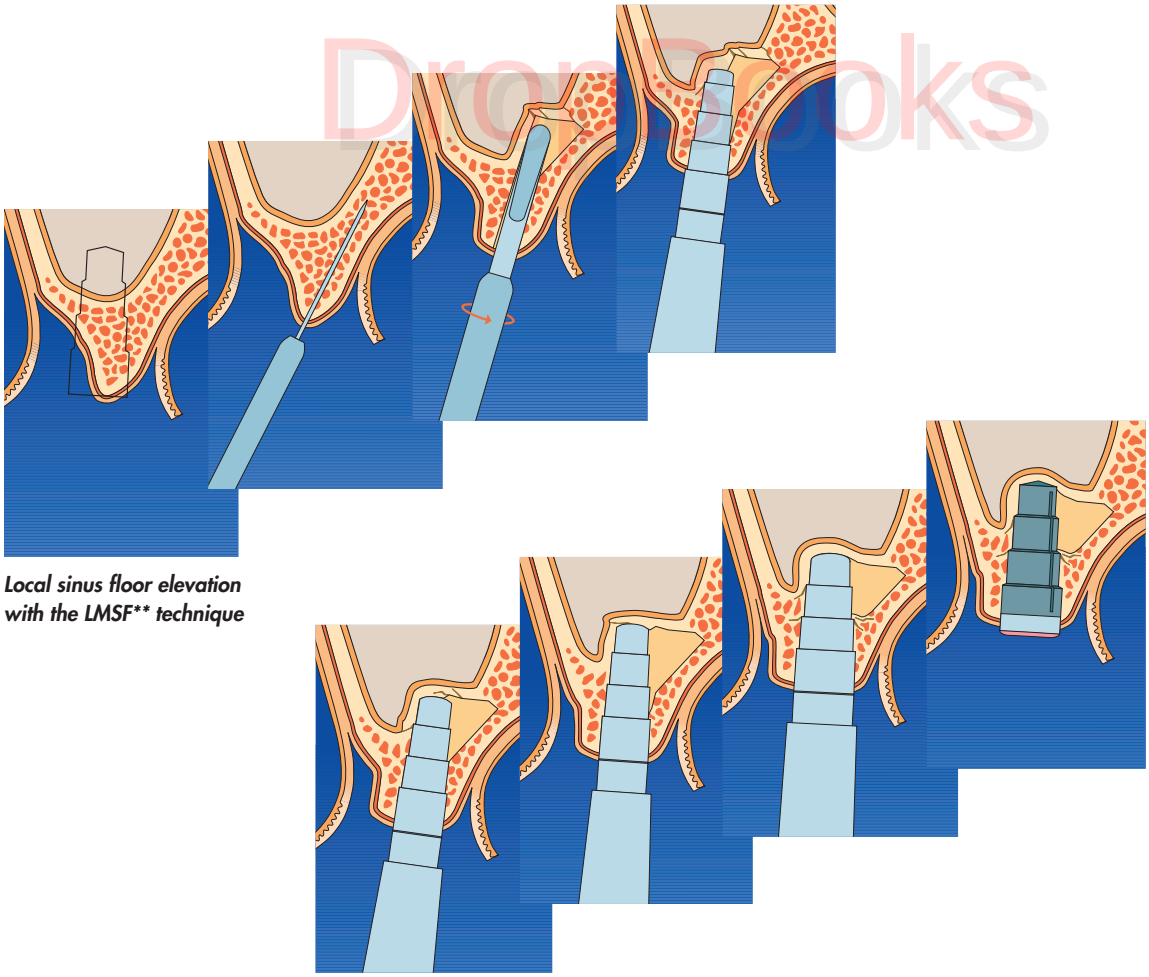
	D 2.0	D 3.0	D 3.8	D 4.5	D 5.5	D 6.5
Universal	■	■	■			
L 10				■	■	■
L 13				■	■	■
L 15				■	■	■

The set also includes a straight seating instrument for FRIALIT®-2 cylinder implants. The FRIALIT®-2 BoneExpanders in diameters of 2.0, 3.0 and 3.8 mm are universally applicable for all lengths. One instrument for every implant length is available for diameters of 4.5 – 6.5 mm.
All instruments should be replaced when they become damaged or after no more than 20 uses. Thorough and careful disinfection and cleaning of the FRIALIT®-2 BoneExpanders guarantees optimum function.

Advantages of the FRIALIT®-2 BoneExpanders

- **Local expansion by spreading the alveolar ridge in narrow atrophied jaws by the ERE* technique**
- **Improvement of the peri-implant distribution of forces and soft tissue support**
- **Local elevation of the maxillary sinus floor in accordance with the LMSF** technique**
- **Alternative to conventional methods for preparing the implant site**

DrandBooks



Local sinus floor elevation with the LMSF** technique

* ERE: Edentulous Ridge Expansion
** LMSF: Local Management of the Sinus Floor

FRIALIT®-2 implants: Easily placed

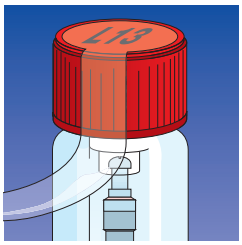
FRIALIT®-2 stepped cylinder

Insertion of the FRIALIT®-2 stepped cylinder

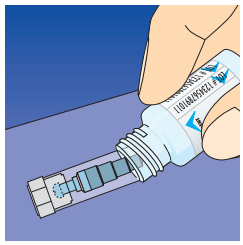
1. After preparation of the implant site, the sealed double-vial container with the implant is removed from the non-sterile outer packaging by the circulating assistant.

2. The circulating assistant removes the seal on the lid of the transparent external vial and unscrews the color-coded lid. NOTE: The outer vial is not sterile!

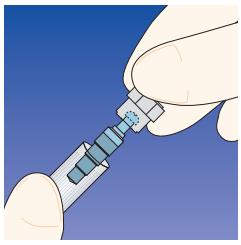
3. Then the sterile contents of the inner vial are slid out onto the operating tray. There are peel-off labels for the patient chart on the external vial for documentation purposes.



Open the seal and unscrew the lid to open the implant vial ...

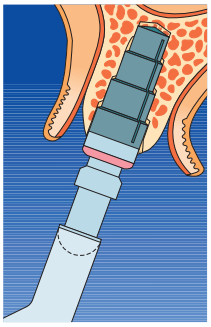


... slide the sterile inner vial onto the operating tray ...



... remove the implant from the sterile inner vial and place it in the site without touching it

With the stepped cylinder, one longitudinal groove is aligned in a facial direction



4. Because the implant is anchored with the placement head surrounded with a silicone stopper, the surgeon can remove the implant from the inner vial with the stopper without breaking the sterile chain.

5. The implant is placed in the site and inserted to the lower edge of the top step with finger pressure. The stopper is then removed. The longitudinal grooves on the surface of the FRIALIT®-2 stepped cylinder mark the center of a hex surface. One of the longitudinal grooves must be facially oriented on insertion of the implant. This orients the internal hex correctly if the case is to be restored with the angled EstheticBase or with a horizontal screw.

6. The corresponding seating instrument (standard, straight, posterior) is positioned on the placement head.

Seating instrument straight, standard, posterior

7. Insertion of the implant is completed by carefully tapping the seating instrument with a surgical mallet.

8. Finally, the placement head is unscrewed. The pre-mounted flat, color-coded cover screw is already in the implant.

Subsequent steps depend on the planned soft tissue management.

FRIALIT®-2 stepped screw
FRIALIT®-2 Synchro stepped screw

Stepped cylinder

Stepped screw

Synchro stepped screw

Insertion of the FRIALIT®-2 stepped screws

1. After preparation of the implant site, the sealed double-vial container with the implant is removed from the non-sterile outer packaging by the circulating assistant.

2. The circulating assistant removes the seal and vial cap.

3. Then the sterile inner vial is slid out onto the operating tray. There are peel-off labels for the patient chart on the external vial documentation purposes.

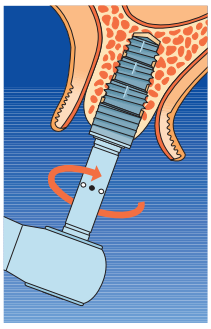
4. The surgeon can now remove the implant from the inner vial by the silicone stopper without breaking the sterile chain. The implant is guided into the cavity on the stopper and inserted with finger pressure. The stopper is then removed and the seating instrument positioned on the placement head.

5. The implant is stabilized in the cavity by lightly tapping the seating instrument (standard, straight, posterior) with a surgical mallet.

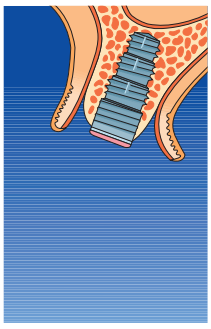
6. The pre-mounted placement head is then removed from the implant.

7. The implant driver for 3.4 or 3.8 – 6.5 diameter implants is positioned in the internal hex. Implant drivers are available for use with the FRIADENT ratchet (see page 62) or the handpiece (see page 64).

DropBooks



8. The FRIALIT®-2 stepped screw is threaded in place with approximately three revolutions. Approximately one-half of the 1.5 mm long implant collar should be above the bone crest. A dot on the implant driver for the stepped screw must be aligned in the facial direction at final seating. The dot identifies the position of the hex.



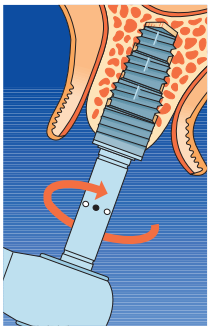
9. Once the FRIALIT®-2 stepped screw has been seated, the implant driver is removed from the internal implant-abutment connection. The cover screw in the silicone stopper is removed and threaded into the implant with the 0.9 mm hex driver.

FRIALIT®-2 implants: Easily placed

The FRIADENT ratchet and the FRIADENT implant driver for stepped screws

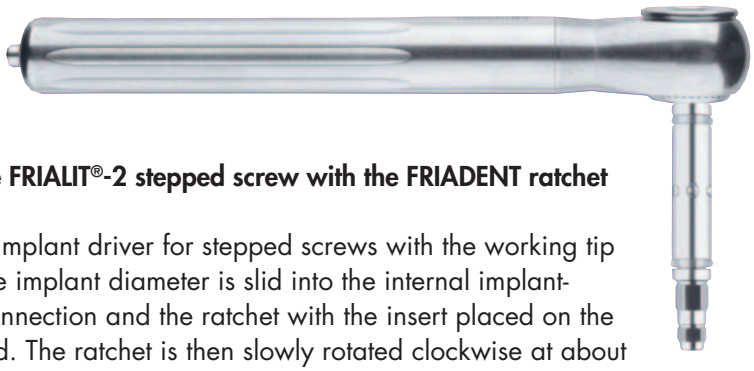
- The 6 cm ratchet, ratchet insert and implant driver for stepped screws are manufactured of surgical steel.
- The implant is brought into its position by threading it in clockwise. An arrow on the ratchet head indicates the direction of rotation.
- The driver insert is placed into the ratchet head and the handle tightened.
- The insert has an internal hex, which accepts the FRIADENT ratchet implant driver for stepped screws.
- The ratchet implant driver for stepped screws has two different sized working ends. There is a 2.5 mm wide hex at both ends, which fits the ratchet insert and the internal geometry of implant diameters 3.8 – 6.5 mm.

- A working tip also has a 2.2 mm wide hex for implant diameter 3.4 mm.
- Six dots are machined in a circle in the center of the implant driver, each marking the center of a face of the internal hex. When the implant is in its final position, one dot must be facially oriented. One of these marks is slightly larger to make it easier for the surgeon to see when one full revolution has been completed. This procedure orients the internal hex correctly for the angled abutment and horizontal screw.
- The FRIALIT®-2 surgical tray includes 12, 16 and 20 mm ratchet implant drivers.



At final placement of the stepped screw one of the dots must be facially aligned

Ratchet head with insert ***Mechanics*** ***Ratchet handle***

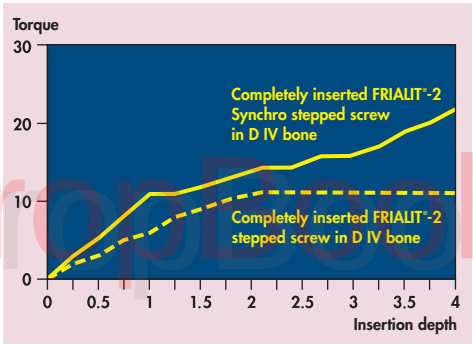


Insertion of the FRIALIT®-2 stepped screw with the FRIADENT ratchet

1. The ratchet implant driver for stepped screws with the working tip matching the implant diameter is slid into the internal implant-abutment connection and the ratchet with the insert placed on the opposite end. The ratchet is then slowly rotated clockwise at about 15 rpm to the final position. Approximately one-half of the 1.5 mm long implant collar should be above the bone crest. Irregularities in the vertical bone height can be compensated with the insertion depth.

2. When the surgeon inserts the FRIALIT®-2 stepped screw manually, he retains direct control over the increasing resistance during the insertion process and, therefore, over the ultimate primary stability of the implant.

Insertion characteristics of "wide body" implants (D 4.5/L 15)



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FRIALIT®-2 implants: Easily placed

Insertion of the FRIALIT®-2 stepped screw with the contra-angle handpiece

The surgical tray includes two implant drivers of surgical stainless steel with a standard shaft for the contra-angle handpiece for insertion of the FRIALIT®-2 stepped screws:

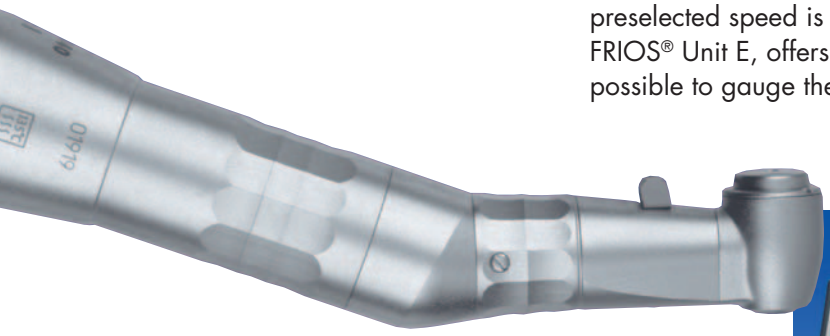
- One implant driver for implants of 3.4 mm diameter, labeled "D 3.4".
- One implant driver for implants of 3.8 – 6.5 mm diameter.

1. There are six dots machined in a circle into the lower third of these instruments to indicate the center of a face of the internal hex.

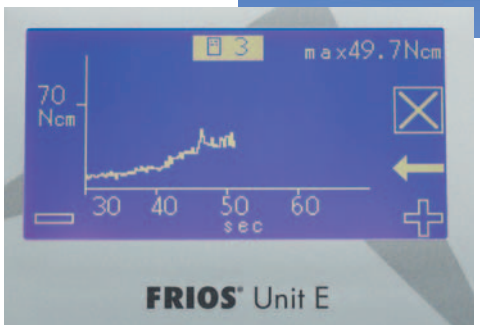
2. The ratchet implant driver matching the implant diameter is selected and latched into the contra-angle handpiece.

3. A suitable program is set on the surgical unit and the implant is screwed into its final position. One of the six dots on the implant driver for stepped screws should be facially aligned. The insertion speed should not exceed 15 rpm to prevent heat necrosis. Irrigation is recommended for larger diameters.

4. Insertion with the aid of the contra-angle handpiece ensures that the preselected speed is not exceeded. If the surgical unit, such as the FRIOS® Unit E, offers the option of measuring the torque, this makes it possible to gauge the primary stability of the implant.



Measuring the torque with the FRIOS® Unit E



The current torque curve is shown on the display

Insertion of the FRIALIT®-2 Synchro stepped screw

After preparation of the implant site, the FRIALIT®-2 Synchro stepped screw is inserted. This corresponds to the procedure for the FRIALIT®-2 stepped screw:

1. The FRIALIT®-2 Synchro stepped screw is placed in the osteotomy with the silicone stopper. The implant can then be screwed directly into its final position with the implant driver for stepped screws.

2. The implant driver is removed.

3. The cover screw is removed from the silicone stopper of the inner vial and screwed into the implant.

4. Depending on the planned soft tissue management, a FRIADENT gingiva former or a FRIADENT EsthetiCap can be placed instead of the cover screw.

Placement of the FRIALIT®-2 Synchro stepped screw in the prepared site with the silicone stopper

DropBooks

SOFT TISSUE MANAGEMENT

Procedure with submerged healing (basics)

The implant is sealed with a cover screw during the healing phase. The extremely flat screw head ensures that the implant heals safely.

PRIMARY

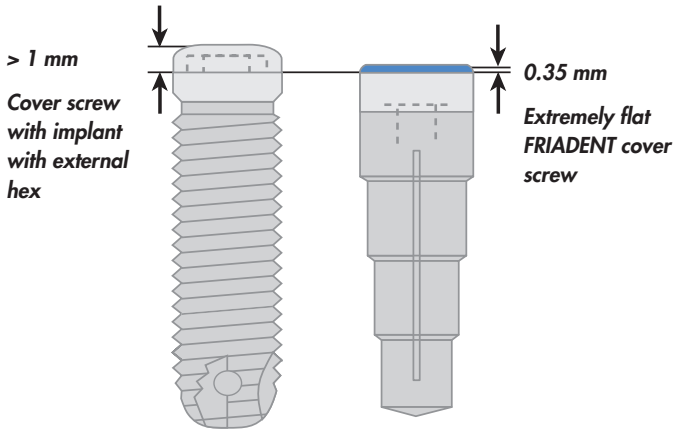
The FRIADENT cover screw – Bacteria-proof healing

Depending on the implant type, the FRIADENT cover screw is either pre-mounted in the implant (stepped cylinder) or stored in the silicone stopper of the inner vial (stepped screw/Synchro stepped screw). The screw head, which is only 0.35 mm high, has an 0.9 mm internal hex to take the 0.9 mm hex driver. The cover screw can also be tightened with the 2.0 mm screwdriver blade. In addition, there is a 1.6 mm thread cut into the screw head to take the FRIADENT BoneProfiler guide pin (see page 69). The FRIADENT cover screws are color-coded to identify the diameter.

FRIADENT cover screws guarantee a secure seal during the healing phase. The flat screw head significantly reduces the risk of perforation of the mucous membrane.

Advantages of FRIADENT cover screws

- **Reduced risk of soft tissue dehiscence**
- **Easy and secure insertion with hex driver**
- **Color-coding for easy identification of the implant diameter**



The FRIADENT gingiva former – Functional soft tissue sculpting

FRIADENT gingiva formers are the optimum solution for contouring the soft tissue after uncovery of osseointegrated implants.

FRIADENT gingiva formers of pure titanium have a machine-polished surface. They are available in gingival heights GH 1, 2, 3 and 5 mm to match the implant diameters 3.4 – 6.5 mm and flare to meet the prosthetic diameters of the crown abutments. The upper edge of the FRIADENT gingiva former is rounded. There is an 0.9 mm internal hex in the center of the top surface and a screwdriver slot. The thread section is color-coded.

FRIADENT gingiva formers in diameters of 3.4 – 6.5 mm and gingival heights GH 1, 2, 3 and 5 mm

DropBooks

Soft tissue sculpting with the FRIADENT gingiva former

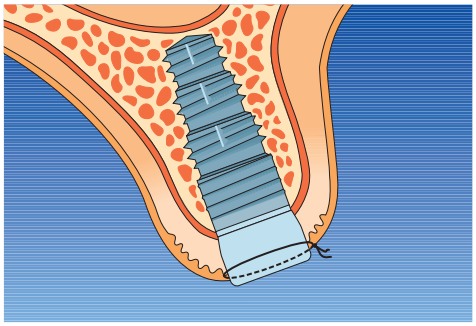
SOFT TISSUE MANAGEMENT

The FRIADENT gingiva former ensures a rotation-symmetrical moulding of the peri-implant soft tissue due to a tight attachement of the soft tissue to the machine-polished surface.

In case of plastic procedures, FRIADENT gingiva formers in gingival height GH 1 mm can also be used instead of the FRIADENT implant cover screws to extend the soft tissue during the healing phase.

Advantages of FRIADENT gingiva formers

- **Functional contouring of the peri-implant soft tissue**[32, 33, 35]
- **Easy and secure positioning with hex driver**
- **Color-coding for easy identification of the implant diameter**
- **Soft tissue contouring with standardized procedures**
- **Use of the gingiva former GH 1 instead of the cover screw to "plump-up" soft tissue**



Soft-tissue sculpting with FRIADENT gingiva formers

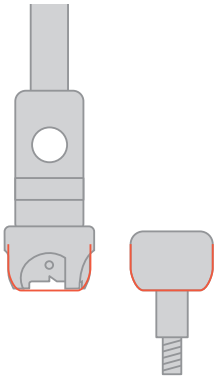
The FRIADENT BoneProfiler – Implant uncovery made easy

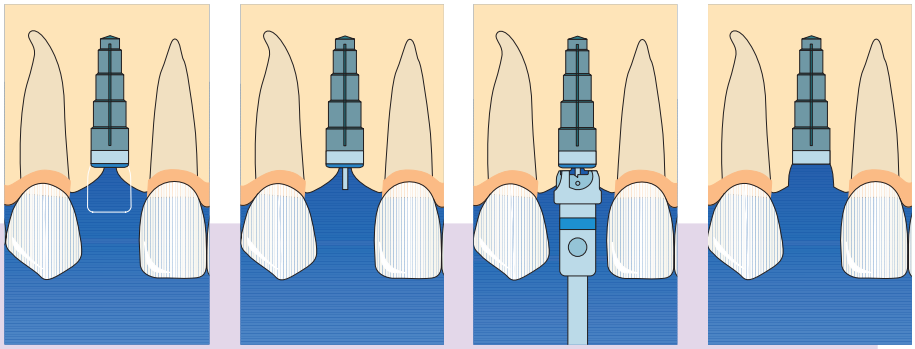
The FRIADENT BoneProfiler is used for easy and precise uncovery of the implant in cases where the bone has grown over the cover screw.

DropBooks

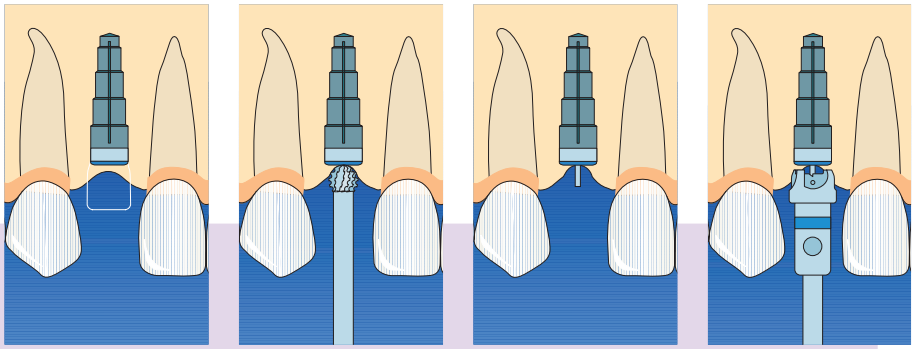
The FRIADENT BoneProfiler is a four-bladed, hollow bur with a 14 mm long standard shaft for the contra-angle handpiece (Ø 2.3 mm) and a separate 5 mm long guide pin. A colored silicone ring and a laser-etched label identify the various implant diameters from 3.4 to 6.5 mm. The working tip with its four blades overlaps the cover screw of the implant. A 4 mm center channel stabilizes the FRIADENT BoneProfiler as it telescopes down over the guide pin. The guide pin is threaded into the cover screw, not directly into the implant, with the 0.9 mm hex driver. The bone removed matches the flare of the corresponding gingiva former.

The FRIADENT BoneProfiler makes removal of the supra-implant hard tissue easy and precise without damage to the implant interface. The guide pin, which is screwed into the cover screw, centers the FRIADENT BoneProfiler and also acts as a depth stop. The geometry of the FRIADENT BoneProfiler ensures precise bone removal for uncovery of the cover screw and delivery of the gingiva former.





Implants partly covered by new bone:
- Thread guide pin directly into the cover screw
- Position the FRIADENT BoneProfiler
- And remove the bone at a speed of 50 rpm.



Implants completely covered with new bone:
- Uncover the center of the cover screw thread with the round drill
- Thread the guide pin into the cover screw
- Seat the FRIADENT BoneProfiler
- And remove the bone at 50 rpm

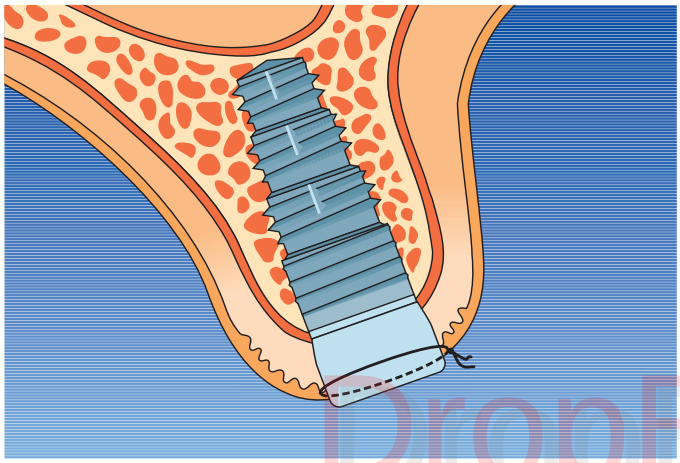
Advantages of FRIADENT BoneProfiler

- **Uncomplicated and rapid uncovery of the cover screw after the healing phase for implant positions below the bone crest**
- **No damage to the implant surface and the peri-implant tissue through centering and depth stop**
- **Exact fitting of secondary abutments with precise bone removal**
- **Smooth restoration of patients through complete seating of gingiva formers, transfer coping and components**
- **Color-coding for easy identification of the implant diameter**

PRIMARY

Procedure with transgingival healing (basics)

Besides classic submerged healing, the two-stage FRIALIT®-2 can also be used as a single-stage transgingival implant system. Studies[32, 33] have shown that retention or early sculpturing of the peri-implant soft tissue eliminates the requirement for subsequent surgical procedures. The peri-implant soft tissue must be given optimum support for transgingival healing. This can be done by placing gingiva formers immediately after placement of the implant to allow the soft tissue to adapt to them.



Transgingival healing with the FRIADENT gingiva former

DropBooks

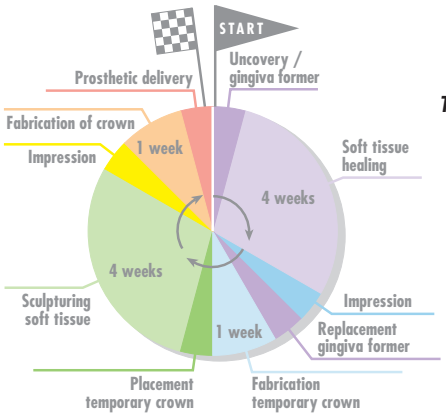
Plan – Sculpt – Support: The FRIALIT®-2 esthetic concept

The soft tissue management in the implant-prosthetic rehabilitation makes a decisive contribution to the long-term esthetic result of the entire restoration. The anatomic contouring of the peri-implant tissue in the esthetical region is particularly important. This sculpturing can be influenced by various factors:

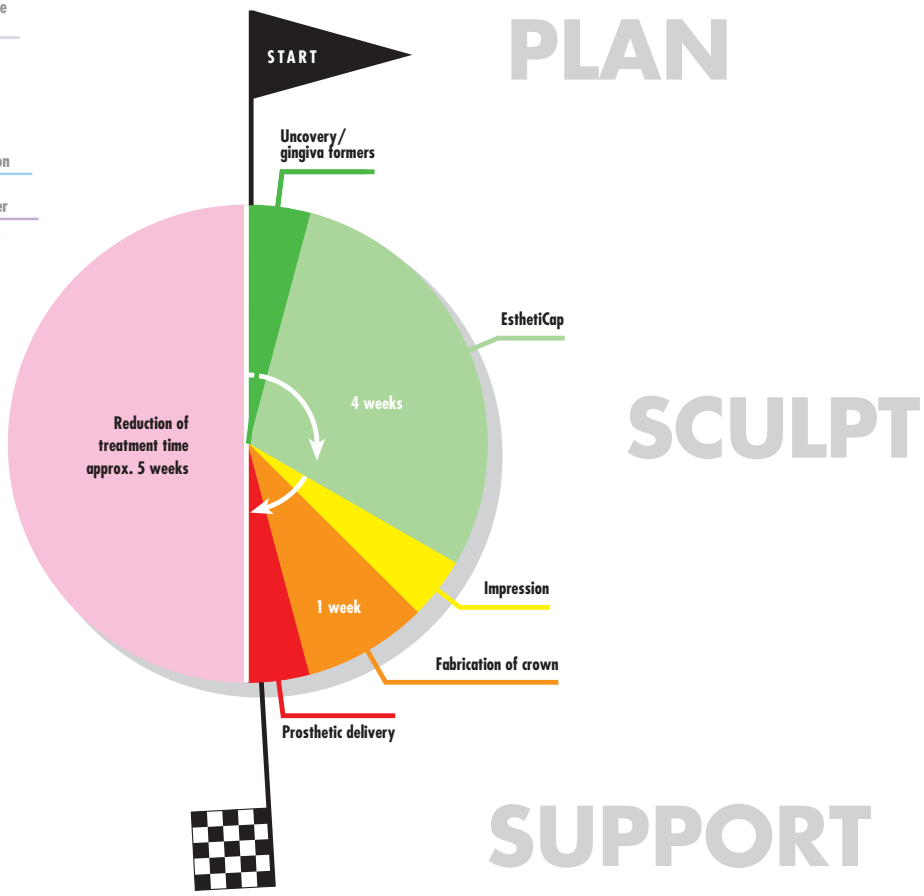
- The vertical position of the implant
- The implant position in mesial-distal and facial-oral direction
- The axial inclination of the implant

Contact, contour and shape of adjacent tooth and implant crowns influence the size and shape of the interproximal space for reconstruction of the papillae. The interproximal space of every tooth group (anterior teeth, premolars, molars) has a specific anatomic profile and requires individualized sculpturing to obtain the proper anatomic result.

The "classical" implant protocol

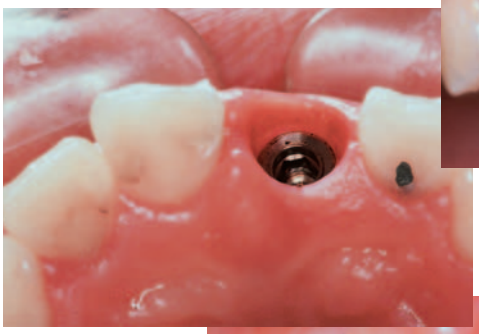


The FRIALIT®-2 esthetic concept



Esthetic sculpturing of the gingiva with the FRIADENT EsthetiCap

Occlusal view: Soft tissue without irritation and infection



Customized FRIADENT EstheticBase fixed into the implant and occlusally closed before cementing the crown

Clinical situation at follow-up examination: natural emergence profile with non-irritated peri-implant soft tissue

Clinical case study: H. Enomoto; Niigata, Japan

DropBooks

Implant index impression

Indexing is a simplified and accelerated procedure for fabricating customized gingiva formers and short and long-term provisional crowns in the laboratory. This registration, taken at the time of implant placement, provides precise data with regard to the implant position to the restorative dentist and the dental technician at an early stage. The transfer to the study cast enables the fabrication of restorations or customized healing abutments while the implant is integrating.

SOFT TISSUE MANAGEMENT

PRIMARY

Procedure with submerged healing (advanced)

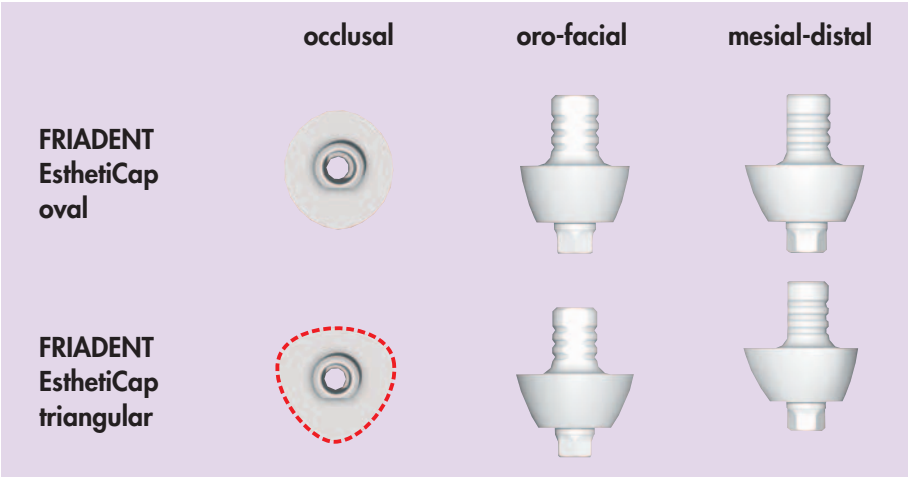
As with the standard procedure, the implant is sealed with a cover screw during the healing phase (see page 66).

SECONDARY

The FRIADENT EsthetiCap – Shape follows nature

The high esthetic requirements for the anterior and premolar regions require three-dimensional soft tissue sculpturing. Immediately after uncovery of the implant, the healing potential of the soft tissue is exploited by placement of the anatomically shaped FRIADENT EsthetiCap.

The FRIADENT EsthetiCap is a tooth-colored, temporary abutment made of plastic and is available in two different shapes (oval and triangular) for implant diameters 3.4 to 6.5 mm. The implant connection geometry, analogous to the FRIADENT implant-abutment connection, has a 2.2 mm high and 2.5 mm wide (2.2 mm with D 3.4) hex for positioning and as a rotation stop. There is a 4 mm high gingival section from the implant interface that extends from the round implant to an oval or triangular cross section (see table). A 3.5 mm high chimney with three circular retention grooves and a flat area extends above the gingival section of the FRIADENT EsthetiCap. The FRIADENT EsthetiCap is attached to the implant with the FRIADENT guide pin or abutment screw. The diameter is indicated by a colored silicone ring, which should be removed prior to use.

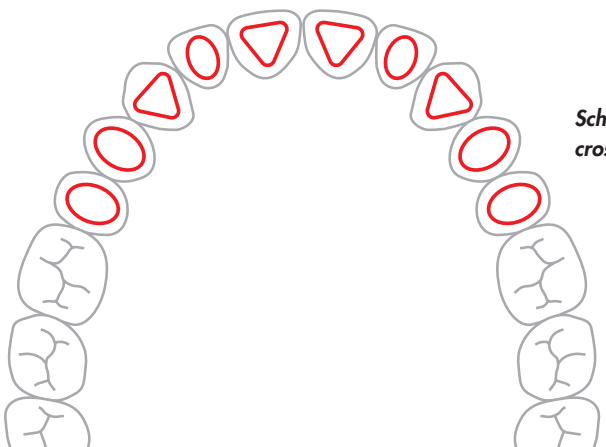


The FRIADENT EsthetiCap is an **anatomically-shaped gingiva former** that can be easily customized for esthetic sculpturing of the peri-implant gingival contours. The goal is to achieve a reliable esthetic result. The natural healing potential is exploited by following the basic rules for regeneration of the papillae.
The FRIADENT EsthetiCap is the anatomically shaped base for fabricating a customized gingiva former. This enables a quick and easy transition from the round implant to a natural root cross section.

Advantages of FRIADENT EsthetiCap

- **Use of the biological regeneration potential from the very beginning**
- **Achievement of optimum peri-implant gingival sculpturing**
- **Implementation of provisional restorations that meet the highest esthetic demands**

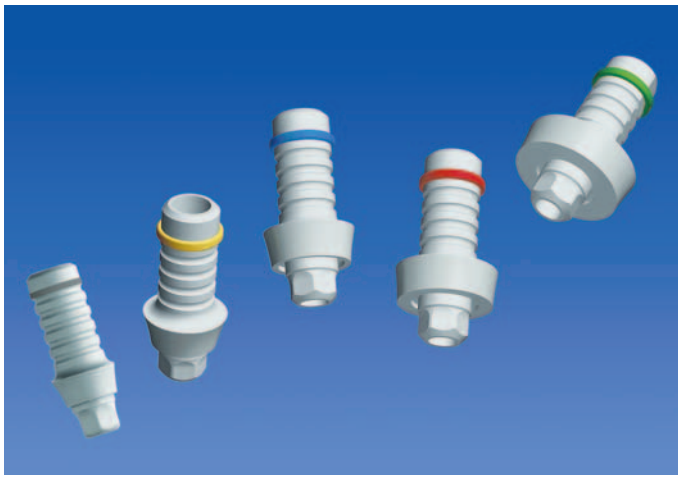
DropBooks



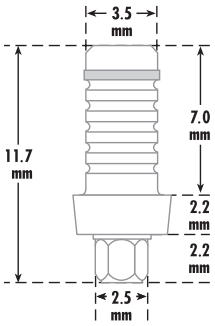
Schematic view of natural root cross sections

The FRIADENT ProTect – A provisional restoration with potential

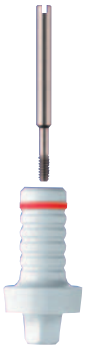
The transgingival soft tissue can also be individually contoured with a provisional restoration on the FRIADENT ProTect abutment.



FRIADENT ProTect in the diameters 3.4 to 6.5 mm

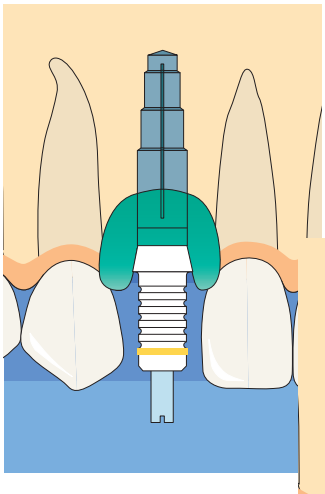


The FRIADENT ProTect is manufactured of plastic and is available in implant diameters of 3.4 to 6.5 mm. The implant connection geometry, analogous to the FRIADENT implant-abutment connection, has a 2.2 mm high and 2.5 mm wide (2.2 mm with D 3.4) hex for positioning and as a rotation stop.



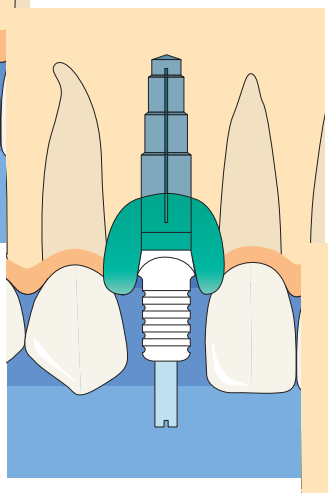
The FRIADENT ProTect has a diameter of 3.5 mm above the 2.2 mm gingival collar. The 7 mm high chimney has five circular retention grooves and a single-sided flat area. The diameter is indicated by a colored silicone ring. The FRIADENT ProTect is attached to the implant with the FRIADENT PickUp guide pin, which also stabilizes it. The 22 mm FRIADENT PickUp guide pin is threaded 1.6 mm into the implant with the 1.22 mm hex driver. If the Pick-Up guide pin is too long, the head should be shortened and reslotted or an abutment screw utilized.

The FRIADENT ProTect is used for manufacturing screw-retained or cemented provisional crowns or bridges. This enables it to be used as the basis for long-term provisionals, which may be required for stabilizing the occlusion or during healing phases in staged cases. Customized gingiva formers adapted to the soft tissue situation can be manufactured by simple modification, either directly by the practitioner or in the laboratory.

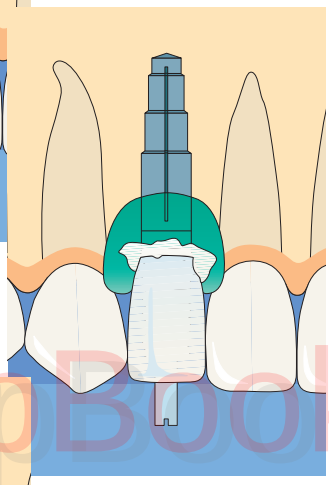


"Chairside" procedure

Attach the FRIADENT ProTect to the implant with the retaining screw; the gingiva is protected by a rubber dam

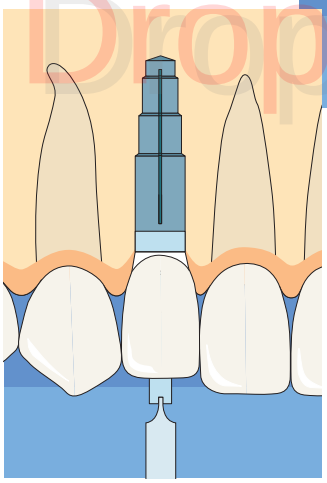


Shorten the FRIADENT ProTect to fit the anatomical situation



Fill the temporary shell or vacuum-formed splint with temporary acrylic and seat it on the FRIADENT ProTect

Shorten and tighten the PickUp guide pin after finishing the provisional restoration

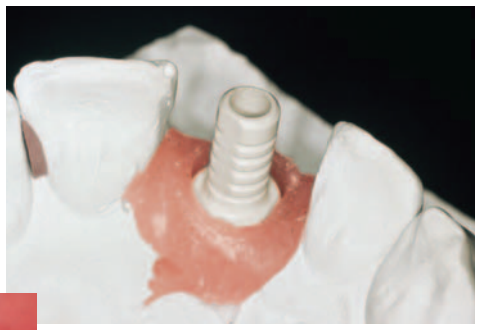


DropBooks

The detailed procedure for fabrication and delivery of a provisional restoration with the FRIADENT ProTect is described in the **FRIADENT ProTect step-by-step instructions.**

"Laboratory" procedure

Placement of the FRIADENT ProTect in the master cast for customizing



FRIADENT ProTect abutment customized with lab-cured composite as a base for a cemented provisional crown

FRIADENT ProTect with provisional crown in situ

Clinical case: D. A. Garber, M. Salama, P. Adar; Atlanta, Georgia, USA

Advantages of FRIADENT ProTect

- **Simple, quick and economical processing chairside or in the laboratory**
- **Overload protection of the implant site analogous to "progressive loading"**
- **Esthetic sculpturing of the gingiva with customized transgingival contouring**
- **Optimal load distribution of the peri-implant bone during the remodeling phase**

Procedure with transgingival healing (advanced) PRIMARY

Besides classical submerged healing, FRIALIT®-2 can also be used for transgingival cases as a two-component implant system. Studies[32, 33] have shown that retention or early sculpturing of the soft tissue can prevent subsequent time-consuming reconstructive surgery. The peri-implant soft tissue must be given optimum support for transgingival healing.

To make use of the biological regeneration potential from the "first step", FRIADENT EsthetiCaps can be placed simultaneously with insertion of the implant. The FRIADENT EsthetiCaps can be customized easily and adapted to the relevant soft tissue situation.

This makes the fabrication and delivery of provisional crowns on FRIADENT ProTect abutments an elegant option for esthetic sculpturing of the soft tissue.

Anatomical and esthetic sculpturing of the peri-implant gingival contours with a customized FRIADENT EsthetiCap

DropBooks

Function

The procedure with the FRIADENT MP abutment is a functional alternative and is described on page 128.

Instruments/prosthetic tray

The FRIALIT®-2 prosthetic tray – at a glance

The sterilizable FRIALIT®-2 prosthetic tray stores all prosthetic components and instruments in a clear and logical arrangement.

The FRIALIT®-2 prosthetic tray is half the size of a standard tray:

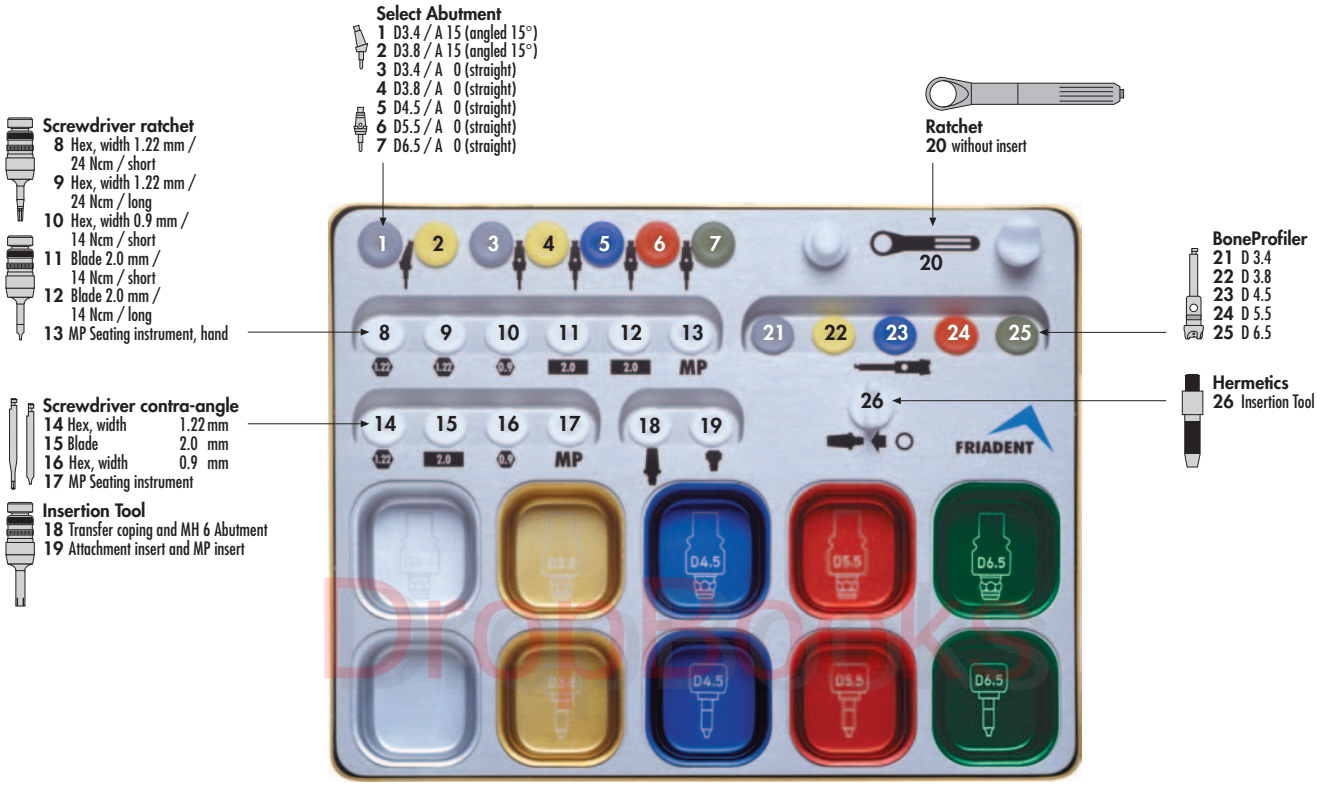
width	length	height
19 cm	14 cm	4 cm

The cover and base plate of the FRIALIT®-2 prosthetic tray are manufactured of aluminum and are perforated for sterilization. The cover is secured with stable clamps. The tray insert is also aluminum with silicone grommets. Appropriate sections are color-coded by diameter. The holders for the FRIADENT ratchet and the seating instrument for FRIADENT Hermetics are of sterilizable teflon. Ten dishes, color-coded to match the implant diameter, are designed to hold gingiva formers and transfer copings (size 2.5 cm x 3 cm x 1.5 cm).

Symbols on the tray insert ensure that the components and instruments are clearly organized.

FRIALIT®-2 prosthetic tray layout

The FRIALIT®-2 prosthetic tray contains spaces for Select abutments, BoneProfilers, ratchet and handpiece drivers, Hermetics instruments, as well as diameter specific trays for gingiva formers and transfer copings.

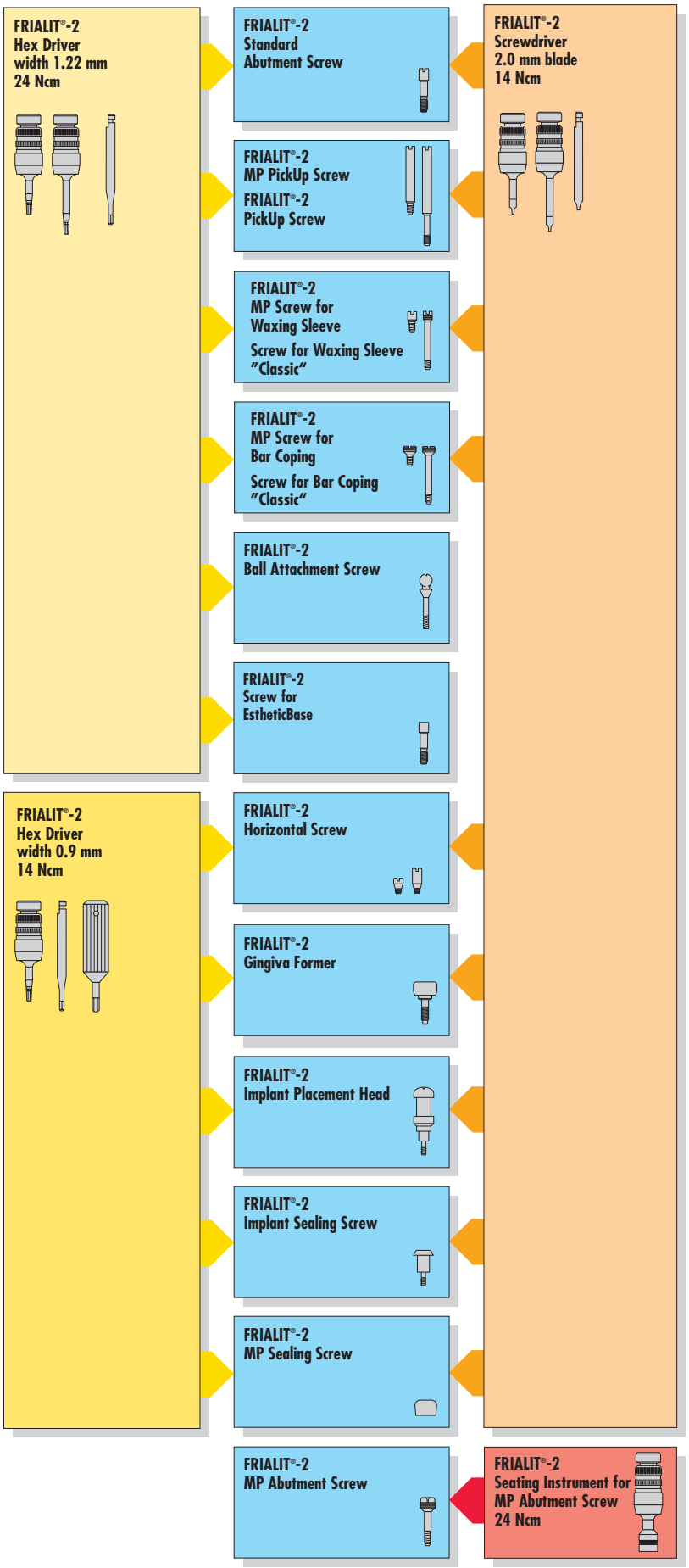


All manual drivers are torque-controlled by a spring mechanism in the head. The driver clicks when the preset torque is reached. All drivers are manufactured of stainless steel.

The 1.22 mm hex driver and the 2.0 mm slot driver have both short (11 mm) and long (16 mm) shanks. The MP and Ball and Socket instruments are also included in the tray.
The FRIADENT Select try-in abutments (see page 38/53) and the FRIADENT BoneProfiler (see page 69) are stored in color-coded silicone holders.

Instruments/tray

The FRIADENT drivers and their sequence of use



The FRIADENT drivers for safe, easy handling and optimum torque-control

Advantages of the FRIALIT®-2 prosthetic tray

- Logical arrangement and storage of system components
- Easy removal of single instruments
- Secure storage of components in silicone holders with FRIADENT color-coding
- Protected sterilization and storage
- Simplified handling due to clear symbols

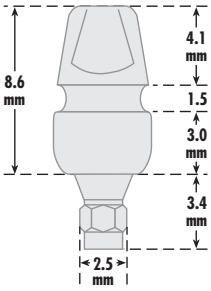
DropBooks

Transfer technique

Impression at implant level with the FRIADENT transfer coping – Remarkably precise

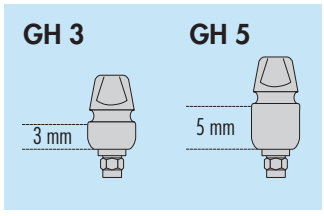
The FRIADENT transfer coping is used for exact reproduction of the vertical and horizontal implant position and orientation of the internal hex. Both the transfer and the PickUp technique (open tray) are made with the same abutment, but with different retaining screws. In both cases, the impression is made at implant level.

The FRIADENT transfer coping has a central opening for an occlusal screw.



The standard version of the FRIADENT transfer coping of sterilizable pure titanium with color-coding has a total height of 8.6 mm from the top of the implant. The 3.4 mm long guide pin locks in the internal hex of the implant. The flare of the standard transfer coping is the same as that of the FRIADENT gingiva former (GH 3). A 1.5 mm deep circular groove locks in the impression material to create a vertical stop. The flared section above the circular groove is 4.1 mm high.

A taller version of the FRIADENT transfer coping is also available (GH 5) for cases with soft tissue thicker than 3 mm. This coping is identified by an additional (3rd) flat area.



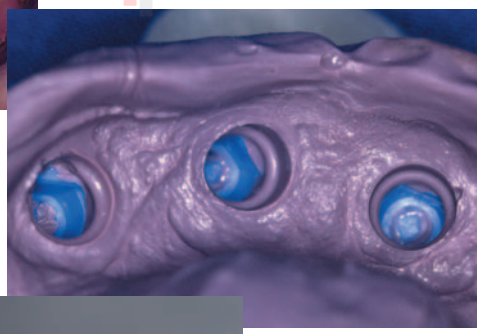
The FRIADENT TransferCap

Two parallel flat areas in the coronal section of the transfer coping receive the FRIADENT TransferCaps to prevent rotation in the impression material. This significantly improves the transfer quality and the precision of the impression.[31]

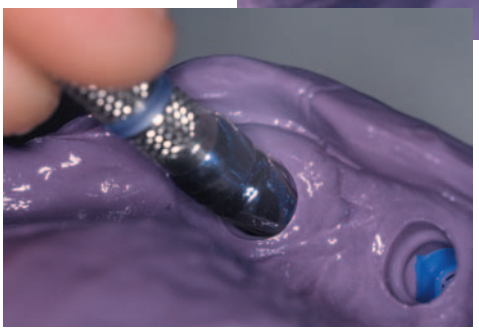
A FRIADENT TransferCap of POM plastic is available color-coded to match every transfer coping in 3.4 to 5.5 mm diameters. The caps are 4.3 mm high and are press-fit onto the conical head of the transfer coping. A 1 mm retention groove and notches secure the FRIADENT TransferCap in the impression compound. For open-tray impressions, the perforated center of the FRIADENT TransferCap is removed to allow insertion of the PickUp guide pin.

Precise transfer with FRIADENT transfer copings and TransferCaps

DropBooks



TransferCaps picked up in the impression

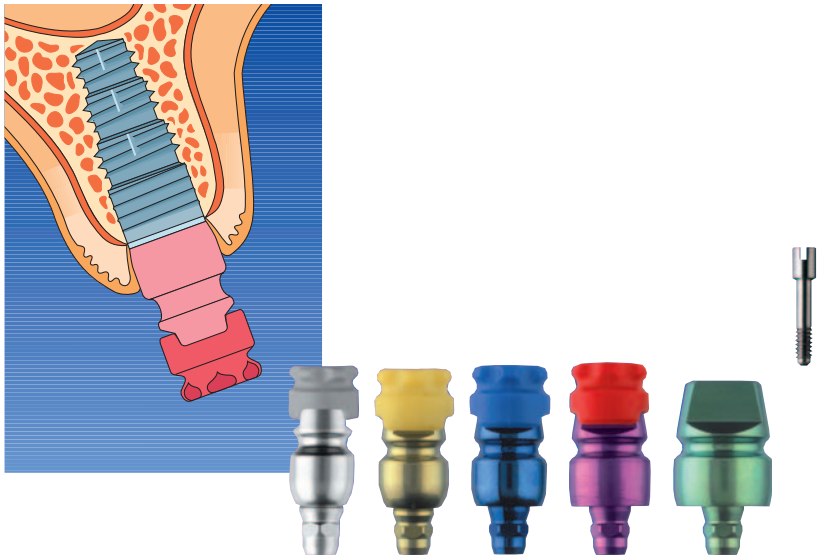


Repositioning the transfer coping with implant analog

Transfer technique/PickUp technique

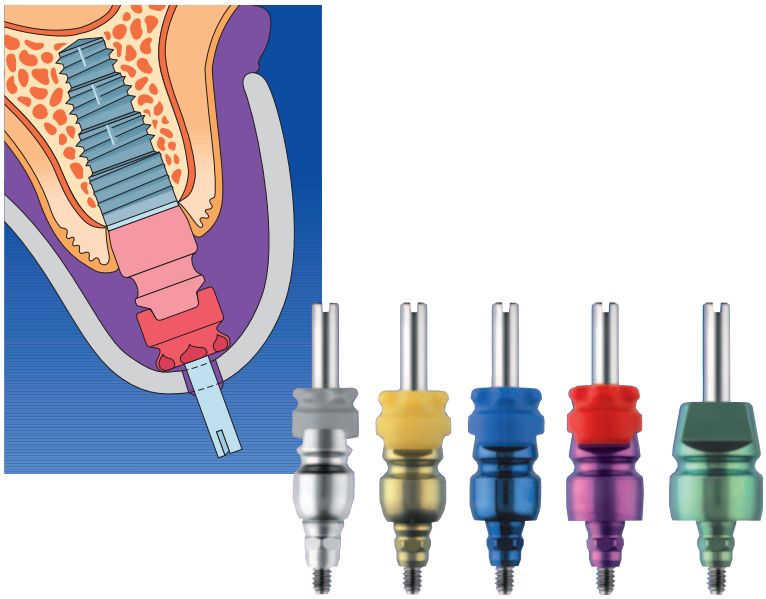
Impression with the transfer technique

The transfer coping has a short abutment screw (10 mm long, 1.6 mm thread thickness) for use with a transfer technique.



Impression with the PickUp technique

In the PickUp technique, the transfer coping is fastened to the implant by a 22 mm long guide pin. The PickUp guide pin extends 7.5 mm out of the coping (only 5.5 mm with GH 5).
The coping screw and the PickUp guide pin each have a 2 mm slot and an internal hex of 1.22 mm for precise positioning and tightening.



Advantages of the FRIADENT transfer coping

- Two impression techniques – one coping
- Supplied with FRIADENT TransferCaps (D 3.4 – D 5.5 mm)
- FRIADENT TransferCaps can be used for both impression techniques
- FRIADENT color coding
- Retention groove for stable positioning in the impression material
- Rotation prevented by flat surfaces
- Two heights based on soft tissue thickness
- Screws with a slot and a hex
- Simple, exact transfer to the master cast

DropBooks

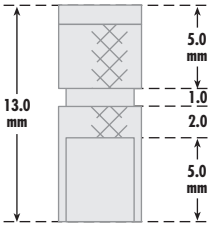
Function

The functional alternative to the impression techniques described above is to make the impression at gingival level using the FRIADENT MP impression coping (described on page 134).

FRIADENT implant analog

The FRIADENT implant analog – Exact replica of the implant situation

The FRIADENT implant analog shows the working base for the technician when impressions are made at the implant level. The top of the implant analog in the master cast matches the top of the implant in the patient's mouth.



The FRIADENT implant analog, manufactured of aluminum with the FRIADENT color-coding for diameters of 3.4 to 6.5 mm, have the identical precise internal and connection geometry as the implant.
The external surface of the implant analog has retentive grooves and a total height of 13 mm. Two parallel 5 mm flat areas are machined into the base as anti-rotational device and precise replica of the implant position. There is also a 1 mm circular groove for additional horizontal stabilization.

FRIADENT implant analogs transfer all relevant information from the clinical implant to the master cast. Its retentive external geometry ensures absolutely stable anchoring in the model.
The position of the internal hex, the implant axis, and the relation to the soft tissue crest are exactly transferred.

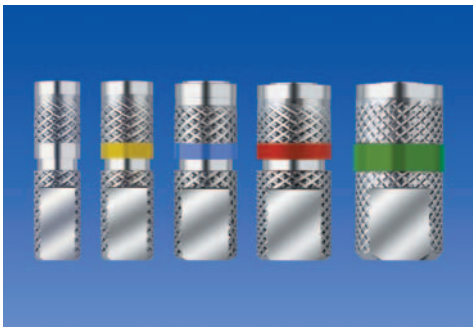
Advantages of FRIADENT implant analog

- **Precise reproduction of the implant in the master cast**
- **FRIADENT color-coding for quick identification**
- **Only one component per implant diameter**

Implant analog in the cast with gingival mask; the top of the laboratory analog matches the top of the implant

The FRIADENT milling analog

The FRIADENT milling analog is offered as an alternative to the implant analog for fabricating the cast using a milling technique.
Its geometry matches the implant analog, but it is manufactured of stainless steel to withstand the forces generated during milling.
The FRIADENT color-coding is indicated by a colored ring.



Stable control of titanium abutments in FRIADENT milling analogs

DropBooks

MP

Function

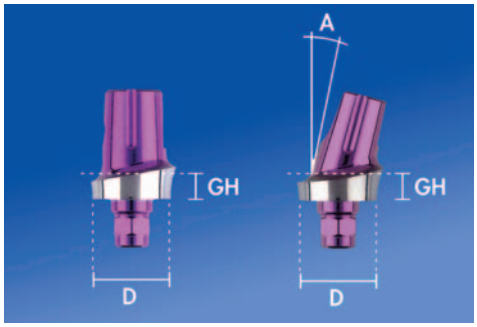
The alternative cast fabrication with the aid of the FRIADENT MP analog is described on page 138.

Single tooth replacement

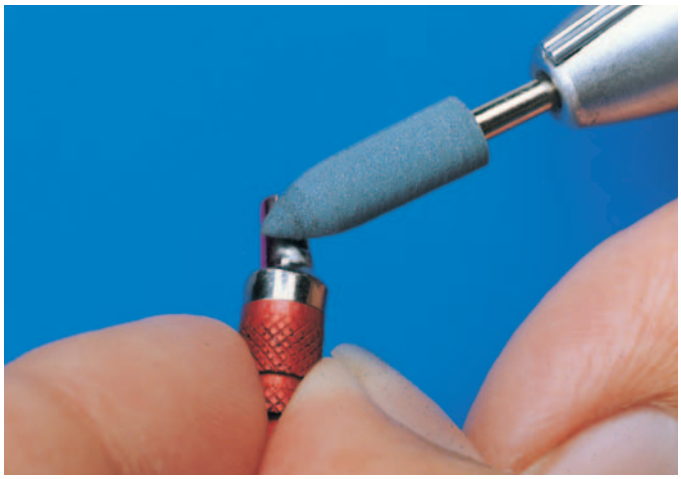
The FRIADENT EstheticBase – Esthetic perfection tooth-by-tooth

FRIADENT EstheticBase abutments are used for fabricating horizontally screw-retained or cemented single-tooth crowns. In addition to its function as a base for the crown, this abutment also transfers occlusal forces to the implant via the crown. The transition from the contour of the implant to the anatomical shape of the restoration also occurs at the crown abutment. This transition influences the shape of the interproximal space.

The prefabricated FRIADENT EstheticBase is made of titanium and can be customized as necessary. The abutment is color-coded by diameter (3.4 – 6.5 mm), having a 3.4 mm guide pin amd 2.5 mm wide hex for anti-rotational telescopic fixation.

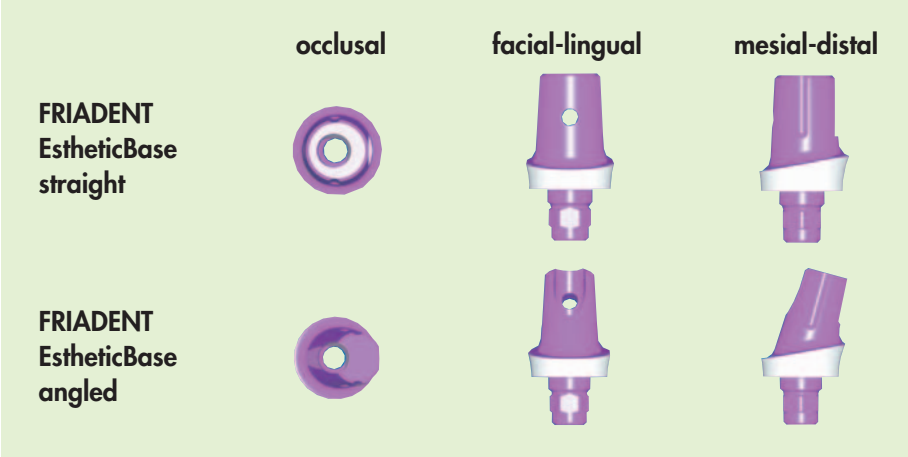


Straight and angled (15°) FRIADENT EstheticBase abutments are available. The anatomically shaped margin is available in 1, 2, 3 and 5 mm gingival heights. The stated gingival height is at the mid-point. The facial margin is 1.0 mm lower than the palatal margin. The shortest shoulder is only 0.3 mm on the GH 1 abutment.



Preparation of a FRIADENT EstheticBase

There is a guide groove on each of the interproximal walls of the abutment. The crown abutment has a slightly oval shape from the occlusal view. The wall thickness of the FRIADENT EstheticBase crown abutment increases as the implant diameter increases.



Depending on the gingival height, the total height is:

Gingival height	GH 1	GH 2	GH 3	GH 5
Total height	6.5 mm	7.5 mm	8.5 mm	10.5 mm
Shoulder facial/lingual	0.3/1.3 mm	1.3/2.3 mm	2.3/3.3 mm	4.3/5.3 mm

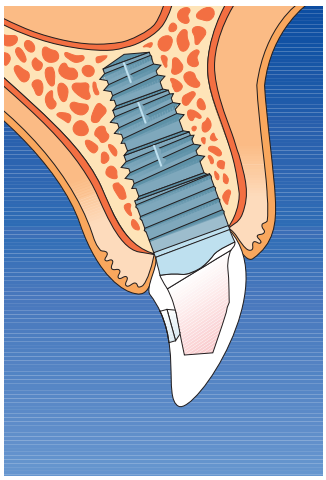
DropBooks

There is a circular groove on the underside of the 4.5 – 6.5 mm diameter FRIADENT EstheticBase abutments for the FRIADENT Hermetics ring.

The EstheticBase abutment screw has a slightly shorter head than the standard abutment screw to avoid interference with the horizontal screw in GH1 cases. The deep internal implant-abutment connection minimizes the stress on the abutment screw and virtually eliminates loosening.

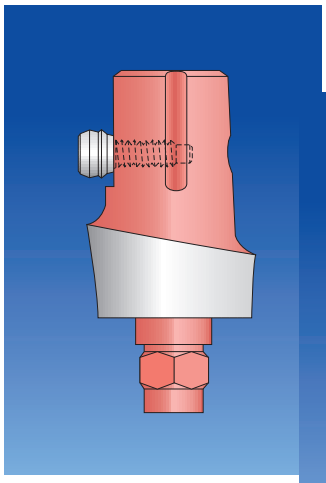
Single tooth replacement

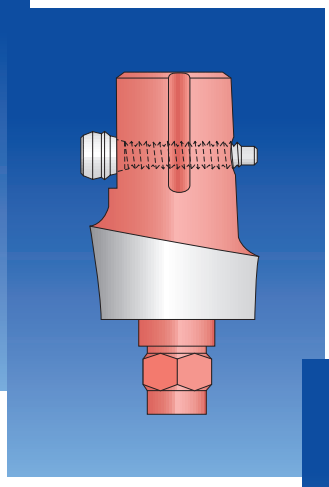
Optional horizontal or transverse crown fastening



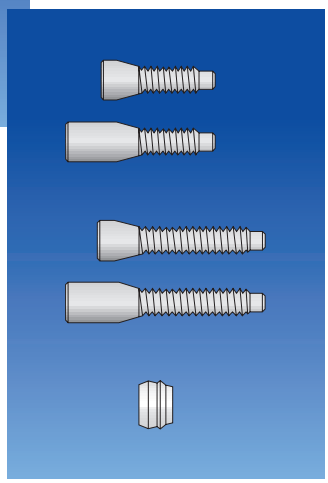
There is a centrally positioned, transcoronal threaded hole 1.4 mm in diameter for the horizontal screw 2 mm above the gingival margin. The seating area of this screw is milled flat for precise location of the prefabricated cast-to screw seat.
The crown can be fixed with either a horizontal or a transverse screw. The horizontal screw allows fastening to the palatal abutment wall (D 3.8 – D 6.5 mm). In contrast, the transverse screw goes through both walls of the EstheticBase abutment (D 3.4 – D 6.5 mm). This provides for twice the thread engagement. Both screws are tightened with the FRIADENT 0.9 mm hex driver. The crown can be secured on its labial surface with the unthreaded tip of the transverse screw. The horizontal screw has a thread length of 4 mm and a head length of 2 mm (standard) or 4 mm (long). The transverse screw is 5.5 mm long and the head lengths are identical (standard - 2 mm; long - 4 mm). A cast-to horizontal screw seat assures precise seating.
The screw seat is also available in a castable version. The finisher for the horizontal screw ensures that the screw fits precisely.

Horizontal screw





Transverse screw



Horizontal screw and transverse screw each with standard and long head and horizontal screw seat

Advantages of the FRIADENT EstheticBase

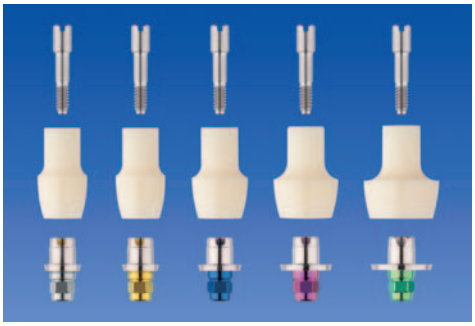
- Preparable, anatomically contoured shoulder
- Straight and angled options
- Esthetic contouring of the crown following the anatomic curve of the shoulder
- Options for fastening the crown: Transversally or horizontally screw-retained (prefabricated), cemented-on
- Precise apposition of the prefabricated horizontal screw seat for the horizontal screw against a flat surface
- Exact fit and simple seating of the crown in the patient's mouth with lateral guide grooves
- Proven, deep internally positioned implant-abutment connection with an internal hex
- Increased stability for the crown and the horizontal screw and reduction of metal needed for the crown with a larger conical section
- Proven FRIADENT color-coding in non-visible area
- No occlusal screws to disrupt the porcelain occlusal table

DropBooks

Single tooth replacement

The FRIADENT CeraBase – A new dimension of natural prosthetics

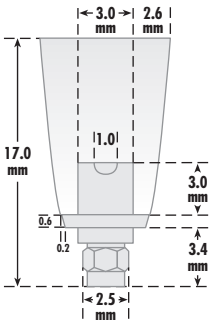
FRIADENT CeraBase ceramic abutments meet the highest demands for an esthetic restoration. They allow for fabrication of perfect single-tooth crowns, particularly full ceramic restorations for the anterior region.[34]



The FRIADENT CeraBase for implant diameters 3.4 – 6.5 mm consists of two components:

1. The titanium insert
2. The ceramic sleeve in two models: conical or anatomical

The titanium insert



The base of the titanium insert contains the FRIADENT 3.4 mm long implant-abutment connection and a 2.5 mm (2.2 mm in D 3.4) wide color-coded hex to prevent rotation. The gingival collar of the titanium plate is 0.6 mm tall and flares 0.2 mm from the implant. A 3.0 mm high guide chimney with a diameter of 3.0 mm extends from the base. There is a 1 mm wide notch at its upper edge. The FRIADENT abutment screw tightens against the insert, preventing stress on the ceramic sleeve.
The 4.5 – 6.5 mm diameters have a circular groove for the FRIADENT Hermetics on the underside of the insert.

The ceramic sleeve

The 10 mm high ceramic sleeve of the FRIADENT CeraBase is composed of extremely resistant aluminum oxide ceramic. The conical ceramic sleeve flares to 2.6 mm from the implant diameter.

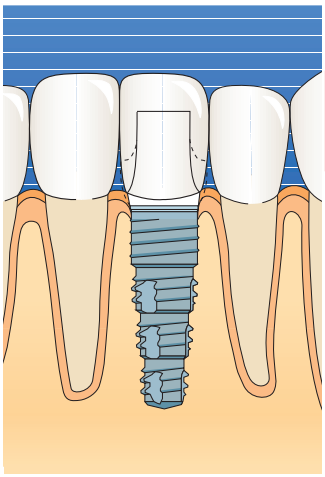
conical ***anatomical***

The coronal end of the conical sleeve flares to the following diameters:

Implant diameter	D 3.4	D 3.8	D 4.5	D 5.5	D 6.5
Prosthetic diameter	6.0 mm	6.4 mm	7.1 mm	8.1 mm	9.1 mm

As an alternative, depending on the procedure and space available, the ceramic sleeve is also available in an anatomical shape. In this version, the ceramic sleeve (anatomical) has a shoulder height of 4.2 mm then narrows to 4.1 mm.
Both ceramic sleeves (conical and anatomical) have a receptacle for the titanium core with a rotation stop.
The ceramic sleeves have a 2.1 mm central hole for the FRIADENT abutment screw.

The FRIADENT CeraBase provides a tooth-colored abutment for fabrication of a non-metallic restoration. The ceramic sleeve guarantees maximum soft tissue compatibility.



The prefabricated ceramic abutment can be used to fabricate ceramic single-tooth crowns, either directly or indirectly.

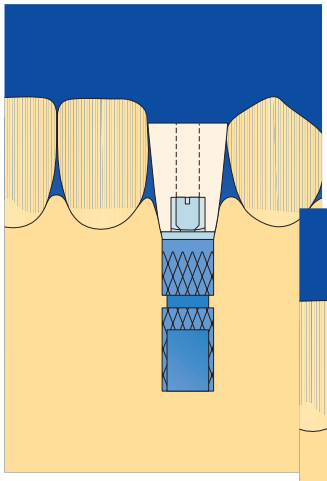
In the **indirect** process, the ceramic sleeve is prepared and a full ceramic crown fabricated and cemented onto it.

In the **direct** process, the ceramic sleeve is veneered with a compatible porcelain. The veneered sleeve is then cemented to the titanium core to fabricate cemented or occlusally screwed, single-tooth crowns.

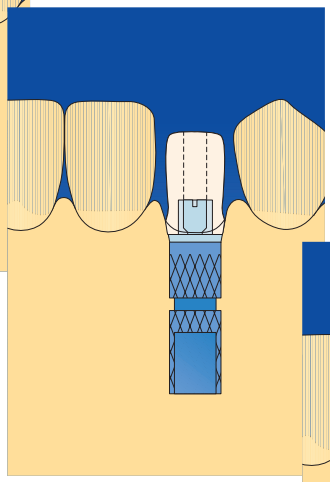
DropBooks

Single tooth replacement

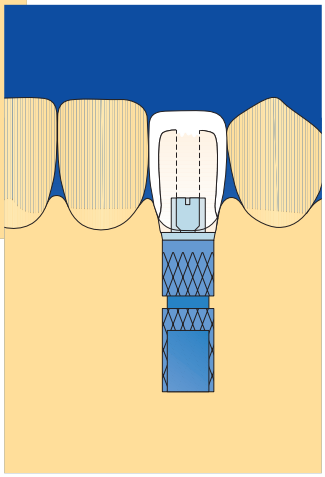
Direct procedure for the FRIADENT CeraBase



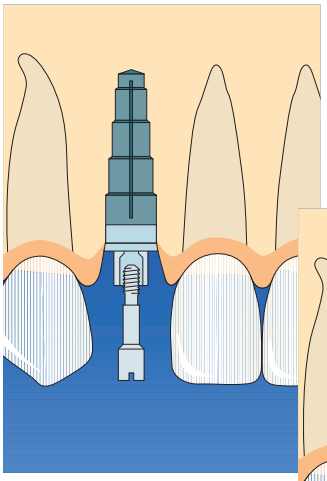
Fastening the FRIADENT CeraBase titanium insert to the implant analog with the abutment screw



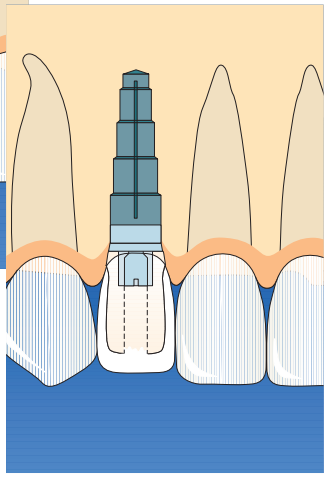
Preparing the sleeve for veneering



Veneering the prepared sleeve with a compatible porcelain (Vitadur Alpha, Vita; Allceram, Ducera)



Delivering the titanium insert and tightening the abutment screw



Cementing the crown to the titanium insert

The clinical and laboratory procedures are described in the **FRIADENT CeraBase step-by-step instructions.**

Advantages of FRIADENT CeraBase

- Meets the highest esthetic demands
- Natural translucence through the soft tissue
- No adverse effect on gingival color
- Non-metallic restoration
- Maximum soft tissue compatibility
- Individualized and natural contouring of abutment and crown
- Fabrication of both cementable and screw-retained, all-ceramic reconstructions

Maximum esthetics with an all-ceramic restoration on the FRIADENT CeraBase

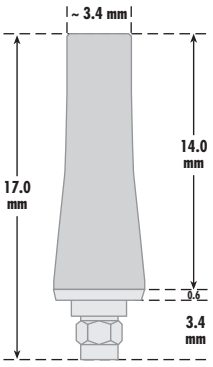
DropBooks

Clinical case: D. A. Garber, M. Salama; Atlanta, Georgia, USA

Single tooth replacement

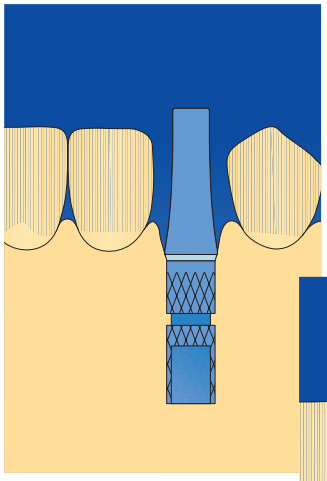
The FRIADENT AuroBase – Unlimited prosthetic possibilities

The FRIADENT AuroBase can be used for fabricating occlusal by screw-retained single-tooth crowns and customized abutments. This abutment is also suitable for use in special cases, such as large angles or restricted interocclusal space.



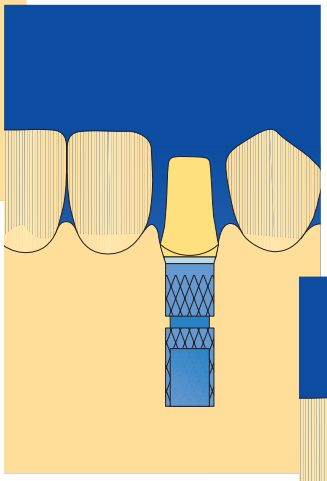
The prefabricated cast-to HSL base is manufactured of a high quality precious metal alloy (high melting point alloy). It has a 3.4 mm high FRIADENT implant-abutment hex connection to prevent rotation, a 0.6 mm high gingival collar and a castable, color-coded waxing sleeve to create the channel for the FRIADENT abutment screw. There is a castable, 14 mm high waxing sleeve with 0.6 mm wall thickness on the HSL base. The proven FRIADENT color-coding is achieved by color up the pore waxing sleeve. The FRIADENT AuroBase is available for implant diameters of 3.4 to 6.5 mm. The 4.5 to 6.5 mm diameters contain a groove on the underside of the abutment for the Hermetics ring. The FRIADENT AuroBase is the basis for fabricating crown abutments for cemented or horizontally screw-retained bridges. It is characterized by unlimited prosthetic versatility.

The FRIADENT AuroBase is used as the base for fabricating customized abutments, cemented or customized screw-retained single-tooth crowns. The prefabricated cast-to implant interface allows unrestricted customization. Special indications for the FRIADENT AuroBase are, therefore, compensating for larger axial divergences, fabrication of occlusally screw-retained, single-tooth crowns, custom-contouring the gingival section, and to fabricate larger abutments.

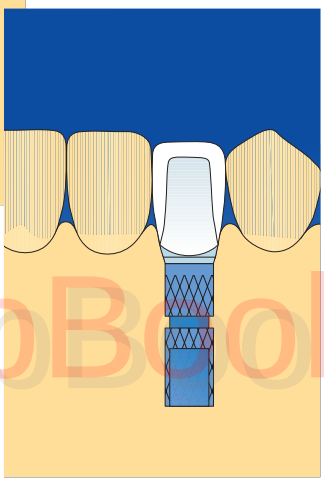


Procedure with cemented or screw-retained crowns

Seating the FRIADENT AuroBase on the analog



RIADENT AuroBase after being customized (shortening and waxing)



Fabricating the PFM crown

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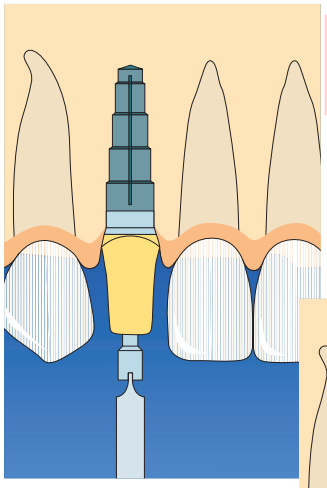
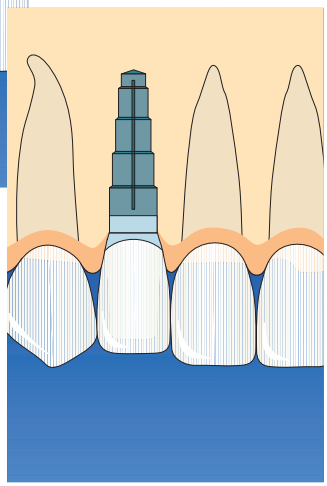


Delivering the customized abutment and tightening the abutment screw



Seating the crown with a horizontal retaining screw or cementing into place

The fabrication of customized crown abutments is described step-by-step in the **FRIADENT AuroBase step-by-step instructions.**

Single tooth replacement

Porcelain-fused-to-gold crown on individually cast FRIADENT AuroBase abutment

Caution: Do not machine the base of the implant interface or it may distort.

Anatomical root cross sections as templates for customize-waxing of AuroBase abutments for esthetic contouring of the surrounding soft tissues

OK	1	2	3	4	5	6	7

UK	1	2	3	4	5	6	7

Advantages of FRIADENT AuroBase

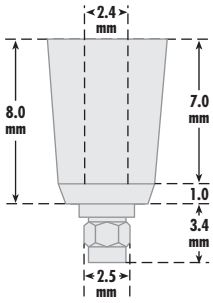
- Fabrication of custom single crowns, even in difficult cases
- Option of customizing from the implant upper edge
- Optimum control of the emergence profile
- Large divergences between implant and crown axis can be corrected
- Maximum precision with a pre-fabricated base
- Easy identification through color-coding

DropBooks

Single tooth replacement

The FRIADENT telescopic abutment – Titanium technology

The FRIADENT telescopic abutment allows the fabrication of directly veneered, occlusally screw-retained single-tooth crowns. It can also be used as a customized abutment for cement-in crowns.



The FRIADENT telescopic abutment is a standardized solid abutment of titanium with a height of 8 mm from the implant-abutment interface. The implant-abutment connection is a 3.4 mm long guide pin and a 2.5 mm (2.2 mm for D 3.4) wide anti-rotational hex. The FRIADENT telescopic abutment has a 1 mm gingival collar and a 7mm tall conical section.

The dimensions are as follows:

Implant diameter	D 3.4	D 3.8	D 4.5	D 5.5	D 6.5
Maximum expansion	5 mm	5,5 mm	6 mm	7 mm	8 mm

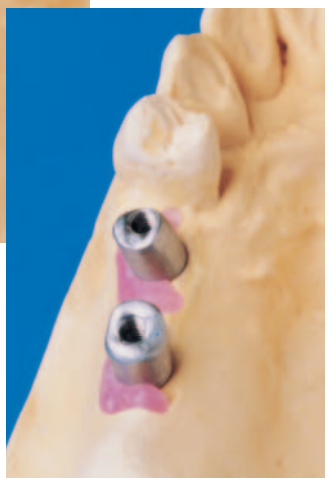
The central internal hole for fastening with the FRIADENT abutment screw is threaded at the top for the seating instrument.
There is a circular groove for the FRIADENT Hermetics ring on the underside of the 4.5 to 6.5 mm diameter abutments.

The FRIADENT telescopic abutment can be prepared in scaffold form for direct veneering with titanium-compatible ceramics (titanium ceramic/Vita, Duceratin/Ducera). Otherwise, the FRIADENT telescopic abutment can be modified to a prep for PFM crowns.

Advantages of FRIADENT telescopic abutment

- **Direct veneering eliminates the requirement for casting**
- **Economical, simple and quick restoration**
- **Flexible application**
- **Good hygiene access**
- **Only one component per diameter**
- **Customized preparation by the technician**

FRIADENT telescopic abutment on implant analogs



Prepared for ceramic veneering

Stacking opaquer

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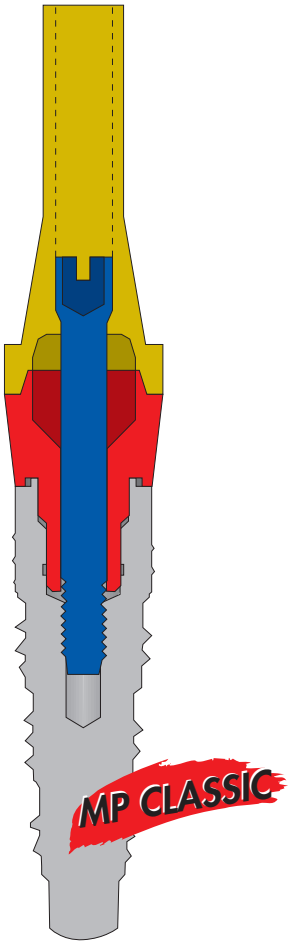
Final veneering with titanium-compatible ceramics



The FRIADENT MP (Multi Purpose) Classic abutment (bridge) – For multiple implant restorations

The FRIADENT MP Classic abutment is used for fabricating occlusal screw-retained bridges. Superstructure and abutment are screw-retained to the implant. The FRIADENT MP Classic abutments and the associated prosthetic components are selected on the master cast in the laboratory.

The FRIADENT MP Classic abutment (bridge) is comprised of the MP insert and the retaining screw for the waxing sleeve. The MP insert is matched to the implant diameter and is identified with the FRIADENT color-coding in the region of the implant-abutment connection. The FRIADENT Classic abutment is available for implant diameters of 3.4 to 6.5 mm.

The FRIADENT MP inserts flare from the implant (see table). There is an 0.8 mm cone on the top of the abutment.

Implant diameter insert	D 3,4	D 3,8	D 4,5	D 5,5	D 6,5
Prosthetic diameter insert	4.8 mm	4.8 mm	5.2 mm	5.9 mm	6.9 mm

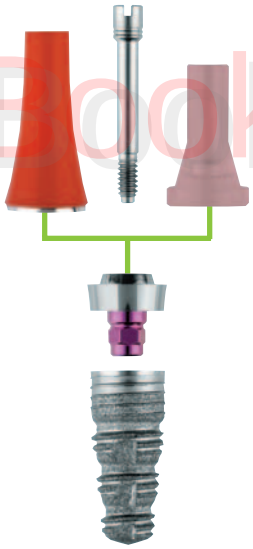
The MP inserts have a central hole and conical expansion for the waxing sleeve screw. A 1.8 mm thread has been cut in the parallel-walled section in which the MP seating instrument is fastened. The MP insert can then be positioned easily. The undersides of the FRIADENT MP inserts (4.5 to 6.5 mm diameter) have a circular groove for the FRIADENT Hermetics ring.

The FRIADENT retaining screw for the MP waxing sleeve has a 1.6 mm thread, a thread length of 3.0 mm, and a head diameter of 2.2 mm. There is a specific screw to match the different gingival heights of the FRIADENT MP inserts (see table). It is identified by grooves on the screw head.

Gingival height	Screw length	Marker grooves
GH 1	13 mm	1
GH 2	14 mm	2
GH 3	15 mm	3
GH 5	17 mm	5

The screws are tightened with the FRIADENT 1.22 mm hex driver or the 2.0 mm FRIADENT slot screwdriver.

■ **Castable and**
■ **cast-to waxing sleeves**
are available for fabricating the framework.



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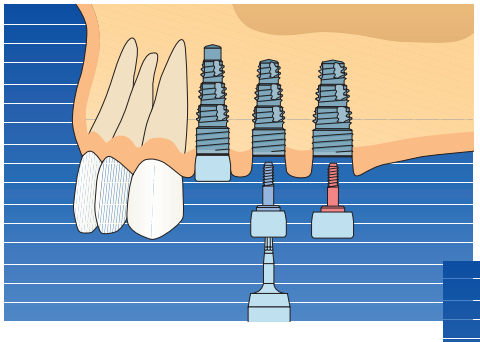
Function

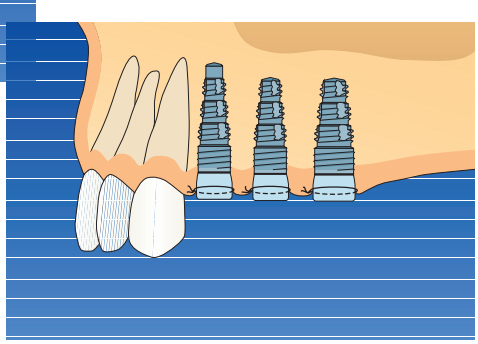
The alternative bridge technique at gingival level with the FRIADENT MP abutment is described on page 140.

Bridges

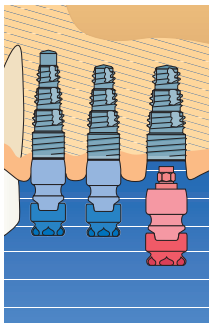


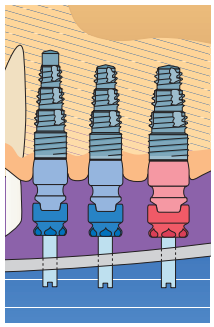
Fabricating a bridge using the MP Classic procedure

Uncovery of the implant and delivery of the FRIADENT gingiva formers



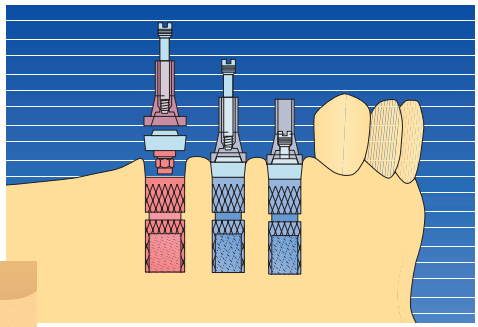
Suturing tightly around the FRIADENT gingiva former to shape the peri-implant soft tissues

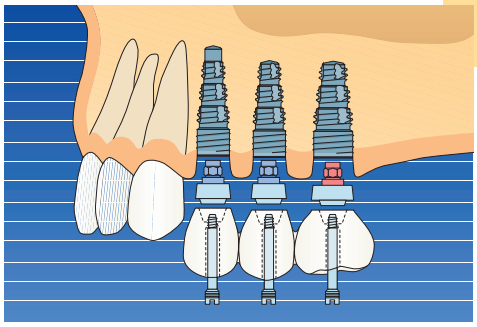




Impression at implant level using the transfer technique or PickUp technique

Selecting the MP inserts according to the implant diameters and the gingival heights after fabrication of the master cast





The fabricated bridge construction and the MP inserts are seated and fastened with the FRIADENT retaining screw

The FRIADENT castable waxing sleeve

The FRIADENT castable waxing sleeve is used for fabricating occlusally screw-retained bridges in combination with FRIADENT MP Classic abutments.

The waxing sleeve, manufactured of poly-methylmetacrylate (PMMA), has a total length of 10.3 mm, is available in diameters 3.4 to 6.5 mm, and is color-coded to match the implant diameter.
It fits the MP insert precisely and matches the diameter of the MP abutment up to a height of approximately 1.5 mm. The waxing sleeve narrows to the diameter of the prefabricated screw shaft of approximately 3.1 mm over a distance of approximately 3 mm. A rotationally symmetrical receptacle on the underside of the waxing sleeve seats over the cone on top of the FRIADENT MP abutment. The FRIADENT retaining screw fastens the waxing sleeve to the implant through the FRIADENT MP abutment.

The FRIADENT MP Classic abutment in connection with the FRIADENT castable waxing sleeve is used to fabricate occlusally screw-retained bridges. The MP Classic abutment and waxing sleeve are selected in the laboratory. The dental technician shortens the waxing sleeve as required and uses it as the basis for the bridge framework.

After casting, the mating surfaces of the waxing sleeve must be cleaned with the FRIADENT finishers (see page 108).

DropBooks

Advantages of FRIADENT castable waxing sleeve

- **Economical fabrication of bridges with a prefabricated component**
- **Can be used with all alloys**
- **Burns out clearly**

The FRIADENT finishers – Precise seating in no time

Finisher for preparing the conical and abutment mating surfaces

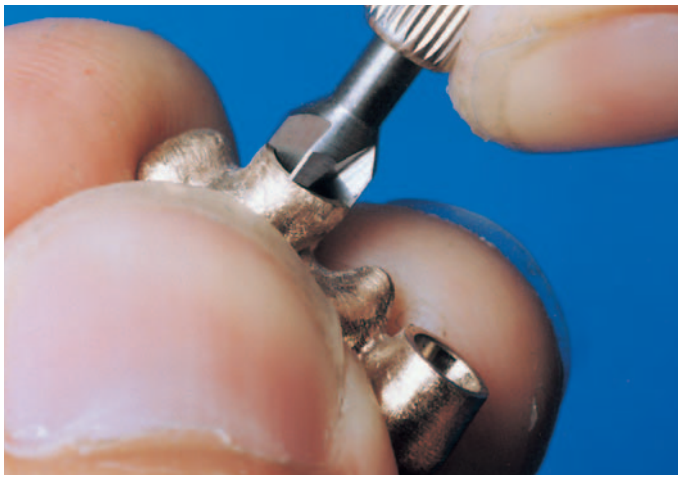
Finisher for preparing the screw head seat in the casting

The FRIADENT finisher, manufactured of stainless steel, is required for simple and exact finishing of flat and mating surfaces after casting the waxing sleeves. These manual instruments consist of a handle approximately 9 cm long to which the working head is attached. They have a four-bladed working surface, whose external geometry corresponds to the MP abutment. One instrument each is available for implant diameters 3.4 to 4.5 mm and diameters 5.5. to 6.5 mm, as well as for finishing the screw seat.
The FRIADENT finishers are identified by a laser-etched label on the handle.

The FRIADENT finisher for finishing the conical and flat surfaces on the waxing sleeve smoothes the mating surfaces and rough spots after casting. The finisher for the screw head seat smoothes the screw head seat and ensures that the FRIADENT abutment screw is correctly and fully seated.

Advantages of the FRIADENT finisher

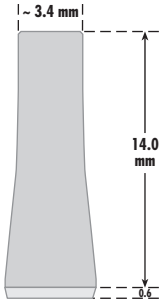
- **Precise and quick finishing of the cast waxing sleeves**
- **Perfect superstructure fit**



The FRIADENT finisher smoothes the contact areas between crown and abutment, screw and screw seat

The FRIADENT cast-to waxing sleeve

The castable waxing sleeve of POM plastic is molded to cover the precision-machined gold cylinder. The total length of the cast-to waxing sleeve is 14 mm and is color-coded by diameter (3.4 to 6.5 diameter). The gingival collar of the gold cylinder is 0.6 mm high and its internal geometry fits precisely on the MP Classic abutment. The abutment narrows conically to a final diameter of 3.4 mm. The FRIADENT retaining screw fastens the waxing sleeve to the implant through the FRIADENT MP abutment.



The FRIADENT cast-to waxing sleeve in combination with the MP Classic abutment is used for fabricating occlusally screw-retained bridges defining the position of the screw head. The FRIADENT MP Classic abutment and waxing sleeve are selected in the laboratory based on the implant diameter and gingival height. The dental technician shortens the sleeve as required and uses it as the basis for waxing the bridge framework.

Advantages of FRIADENT cast-to waxing sleeve

- **Fabrication of high-quality bridges using precision-machined components**
- **Defined creation of the screw channel**
- **Prefabricated precision fit due to high quality precious alloy**
- **Color-coded POM waxing sleeve burns out clearly during the casting process**

DropBooks

The FRIADENT cast-to waxing sleeve can only be cast with alloys with a similar TEC value.

Note: The finisher is not required when using the FRIADENT cast-to waxing sleeve.

The FRIADENT SolderSet bridge

When using soldering techniques, the framework must be firmly fixed in the soldering investment to guarantee a precise procedure. Heat-resistant FRIADENT soldering analogs can be used, regardless of the implant diameter. They are invested in the investment model together with the screw retained and splinted bridges.

The 12 mm long stainless steel FRIADENT bridge soldering analog can be used with all implant diameters. It consists of a soldering base retentive groove to hold the analog firmly in the soldering investment. The top of the analog matches the top of the MP abutment. The set also contains a soldering screw.

The FRIADENT SolderSet bridge secures the bridge sections in the investment model. Fastening the framework to the soldering base with a retaining screw guarantees freely accessible soldering joints and uniform heating. The result is tension-free soldering.

Advantages of the FRIADENT SolderSet bridge

- **Fixed location in the investment model**
- **Good access to soldering joints**
- **Tension-free soldering with uniform heat distribution**

The FRIADENT EstheticBase – Esthetic perfection with bridges

see page 90

FRIADENT EstheticBase abutments are also suitable for restoration of multiple implants with bridges. In addition to supporting the bridge, the abutments also assist in transferring the occlusal forces to the implant.
The bridge reconstructions can be cemented or horizontally screw-retained.

FRIADENT EstheticBase abutments have pre-tapped holes for horizontal or transverse screws

DropBooks

The prefabricated FRIADENT EstheticBase abutments of titanium are available in 3.4 to 6.5 mm diameters. They can be customized and have the FRIADENT system deep internal implant-abutment connection at the base. Rotation is prevented by a 3.4 mm long guide pin and a 2.5 mm wide hex (2.2 mm with D 3.4), as in case of telescopic connections. FRIADENT EstheticBase abutments are available in 0° (straight) or 15° (angled) versions. The anatomically-shaped shoulder is available in multiple gingival heights (1, 2, 3 or 5 mm). The lowest facial margin is 1 mm shorter than the highest point on the palatal margin. The shortest facial shoulder is only 0.3 mm on the GH1 abutment. There is a centrally positioned, transverse threaded hole, 1.4 mm in diameter for the horizontal screw, 2 mm above the palatal margin. The seating area for the horizontal screw is machined flat.
The guide grooves in the proximal walls of the abutment can be blacked-out to make it easier to seat the bridge.
The abutment has a slightly oval shape from the occlusal view.
The thickness of the cone section of the FRIADENT EstheticBase abutment increases with increasing implant diameter.

Bridges

Total height of the FRIADENT EstheticBase:

Gingival height	GH 1	GH 2	GH 3	GH 5
Total height	6.5 mm	7.5 mm	8.5 mm	10.5 mm
Gingival margin height facial/lingual	0.3/1.3 mm	1.3/2.3 mm	2.3/3.3 mm	4.3/5.3 mm

The underside of the 4.5 to 6.5 diameter FRIADENT EstheticBase abutments have a circular groove for the FRIADENT Hermetics ring.

Horizontal forces are transferred directly to the internal geometry of the implant by the abutment. This design greatly decreases the stress on the EstheticBase abutment screw.

Advantages of the FRIADENT EstheticBase

- **Customizable, anatomically contoured abutment**
- **Straight or angled options to adjust to the crown axis**
- **Possibility to compensate axial divergences**
- **Anatomic shoulder margin for an esthetic result**
- **Transverse and horizontal screw retention; Cement-on or screw-retained options**
- **Eliminates occlusal screws**
- **Flat surface for precise seating of the seat for the horizontal retaining screw**
- **Proven, deep internal hex implant-abutment connection**
- **Reduction of framework bulk with wider conical sections**
- **Increased stability of the abutment and horizontal screw retention**
- **FRIADENT color-coding by diameter**

Details on the horizontal and transverse screws and FRIADENT EstheticBase abutments can be found on page 92.

The FRIADENT AuroBase – Unlimited prosthetic versatility

see page 98

For bridges, the FRIADENT AuroBase is used for fabricating custom abutments in particularly difficult cases, including large axial divergences or reduced interocclusal space. Bridge reconstructions on FRIADENT AuroBase can be cemented or horizontally screw-retained.

The prefabricated cast-to HSL base is manufactured of a high quality precious metal alloy (high melting point alloy). It has a 3.4 mm high FRIADENT implant-abutment hex connection to prevent rotation, an 0.6 mm high gingival collar and a castable, color-coded waxing sleeve to create the channel for the FRIADENT abutment screw. There is a castable, 14 mm high waxing sleeve with 0.6 mm wall thickness on the HSL base. The proven FRIADENT color-coding is achieved by color up the pore waxing sleeve. The FRIADENT AuroBase is available for implant diameters of 3.4 to 6.5 mm. The 4.5 to 6.5 mm diameters contain a groove on the underside of the abutment for the Hermetics ring. The FRIADENT AuroBase is the basis for fabricating crown abutments for cemented or horizontally screw-retained bridges. It is characterized by unlimited prosthetic versatility.

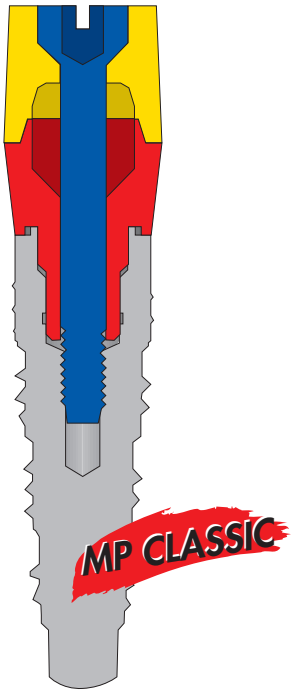
Advantages of FRIADENT AuroBase

- **Fabrication of cemented or screw-retained bridges**
- **Option of customizing from the top of the implant**
- **Optimum control of the soft tissue contours and emergence profile**
- **Compensation of larger axial divergences between implant and crown**
- **Maximum precision with a machined gold cylinder**
- **Easy identification with the proven FRIADENT color-coding**

Caution: Do not sandblast or alter the base of the abutment.

DropBooks

Overdentures



The FRIADENT MP (Multi-Purpose) Classic abutment (bar) – Multiple implant restoration made easy

The FRIADENT MP Classic abutment is designed for fabricating bar overdentures with at least two implants in the mandible and at least four implants in the maxilla. The bar-coping assembly and abutment are mounted on the implant with an occlusal screw. The cone on the top of the abutment allows compensation for axial divergence in the implants. The FRIADENT MP Classic abutments and the associated prosthetic components are selected on the master cast in the laboratory.

The FRIADENT MP Classic abutment is composed of the MP insert and the bar coping screw. The MP insert matches implant diameters 3.4 to 6.5 mm and is identified with the FRIADENT color-coding in the region of the implant-abutment connection.
The FRIADENT MP inserts flare from the implant (see table) and there is a cone approximately 0.8 mm high on the top of the insert.

Implant diameter insert	● D 3,4	● D 3,8	● D 4,5	● D 5,5	● D 6,5
Prosthetic diameter insert	4.8 mm	4.8 mm	5.2 mm	5.9 mm	6.9 mm

The titanium MP inserts have a central hole and conical flare for the bar coping screw. There is a 1.8 mm pre-cut thread in the parallel-walled section. The seating instrument is threaded into the MP insert so the component can be easily carried and completely seated.
The FRIADENT bar coping screw has a 1.6 mm diameter and the 3 mm long threaded section has a head diameter of 2.8 mm.

There are screws to match each gingival height of the FRIADENT MP inserts (see table). The screw heads are marked with grooves for identification.

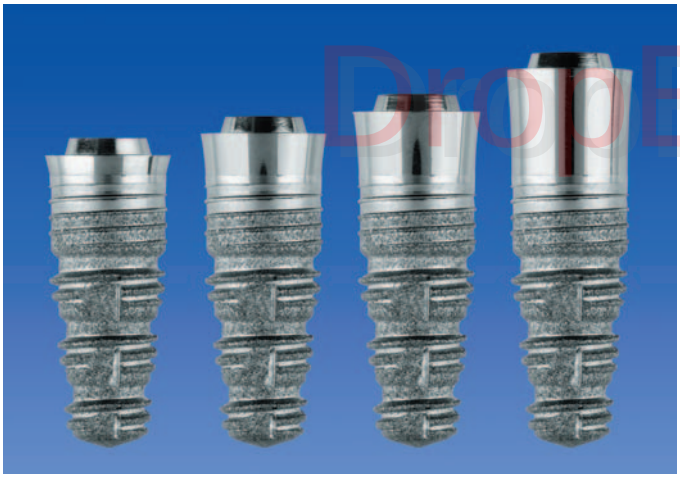
** M = metric precision thread*

Gingival height	Screw length	Marker grooves
GH 1	13 mm	1
GH 2	14 mm	2
GH 3	15 mm	3
GH 5	17 mm	5

The screws are tightened with the FRIADENT 1.22 mm hex driver or the FRIADENT 2 mm slot screwdriver.

There is a circular groove on the underside of the 4.5 to 6.5 mm diameter inserts for the FRIADENT Hermetics ring.

Bar-supported overdentures are fabricated with bar clips using prefabricated FRIADENT bar copings and FRIADENT round bars (precious metal or titanium). A castable coping is also available.



FRIADENT MP Classic abutment in gingival heights GH 1, GH 2, GH 3, GH 5

DropBooks

Overdentures

The FRIADENT bar coping – Connection by soldering or laser-welding

The FRIADENT bar coping is used for fabricating bar overdentures in combination with FRIADENT MP Classic abutments. They are available as prefabricated components for soldering and laser-welding.

FRIADENT bar coping

FRIADENT precious metal bar copings for implant diameters 3.4 to 6.5 mm are available in high gold content alloy (for soldering) or in titanium (joined by laser-welding).
The 4.5 mm high gold coping is 4.8 mm in diameter coronally. The coping-abutment connection matches the diameter of the abutment.
The coping has a symmetrical recess to allow seating on the abutment. The bar is fastened to the implant with the FRIADENT MP coping screw through the MP abutment.

Advantages of FRIADENT bar copings at a glance:

- **Prefabricated, precision-fit to FRIADENT MP abutments**
- **Defined screw head position**
- **Gold, plastic, and titanium options**
- **High-quality precious metal alloy**
- **Alternatively: Titanium-based technology**

CAUTION: The gold bar coping should be soldered-to, not cast-to.

FRIADENT round bars – Custom-fit secure retention

FRIADENT round bars are used to retain overdentures in combination with FRIADENT MP Classic abutments and bar copings.

FRIADENT round bars

FRIADENT precious metal round or titanium bars are round in cross section with a diameter of 2 mm. They are available in a uniform length of 50 mm and can be attached to FRIADENT bar copings by soldering or laser-welding.

FRIADENT bar copings and round bars

The bars are sectioned to fit between the bar copings. Bar constructions based on gold bar copings are attached by soldering. FRIADENT bar copings and round bars of titanium are attached by laser-welding.
After fabrication, the bar construction is seated on the MP abutments and fixed in place with the FRIADENT coping screw. The bar splints the implants and retains the denture.

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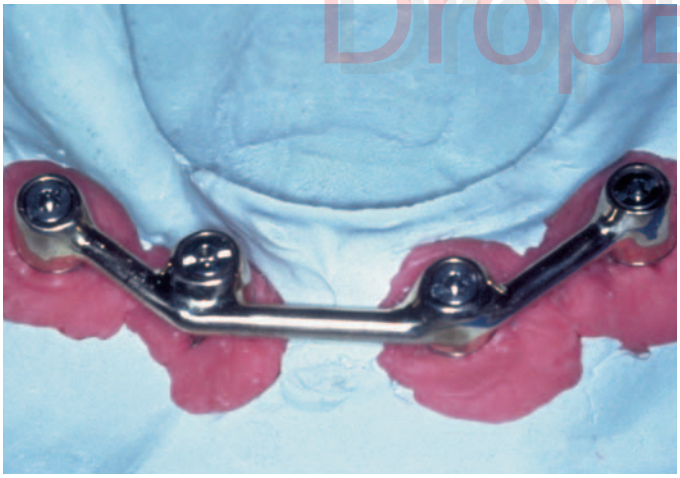

FRIADENT round bars soldered to FRIADENT bar copings on the MP abutments

Overdentures

The FRIADENT Bar SolderSet – Preventing stress

When using soldering techniques, the framework must be firmly fixed in the investment. Heat-resistant FRIADENT bar soldering analogs can be used, regardless of the implant diameter. They are invested in the investment model together with screw retained and splinted bars.

The 12 mm long bar SolderSet consists of a soldering base with retentive surface matching the geometry of the FRIADENT MP analog and of a titanium soldering screw.

The FRIADENT SolderSet bridge secures the sectioned bar in the soldering base. Fastening the framework to the soldering base with a retaining screw guarantees freely accessible soldering joints and uniform heating. This ensures tension-free soldering.

Advantages of the FRIADENT SolderSet bar

- **Fixed location in the soldering investment**
- **Good access to soldering joints**
- **Tension-free soldering with uniform heat distribution**

The FRIADENT bar clip – Secure overdenture retention

The activable FRIADENT bar clips are polymerized in the overdenture, thereby securely holding the prosthesis on the bar construction. The FRIADENT bar clips are secondary components manufactured of a high-quality precious metal alloy. They are available in 50 mm sections and have an omega-shaped profile to match the FRIADENT round bar. They have a retentive section at the top for secure fixing to the overdenture. The retention of the FRIADENT bar clips can be adjusted with the FRIADENT bar clip activator.

The bar clip activator is composed of three key-shaped instruments with different blade widths (3, 10 and 15 mm) depending on the length of the bar segment that is to be activated.

The FRIADENT bar clips fix the prosthesis on the bar by friction, which can be adjusted.

Advantages of FRIADENT bar clips

- **Prefabricated, matched and custom-fitted components for retaining overdentures**
- **Mobility of the prothesis due to round design**
- **Easy stabilization of the prothesis in compromised situations (e. g. severe recession)**
- **Quick and secure fabrication of a bar reconstruction**
- **Use in conventional prosthesis**
- **Short vertical height**

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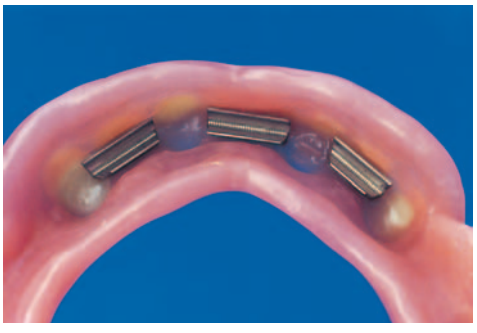
Caution: Do not overactivate the matrix (danger of breakage)!

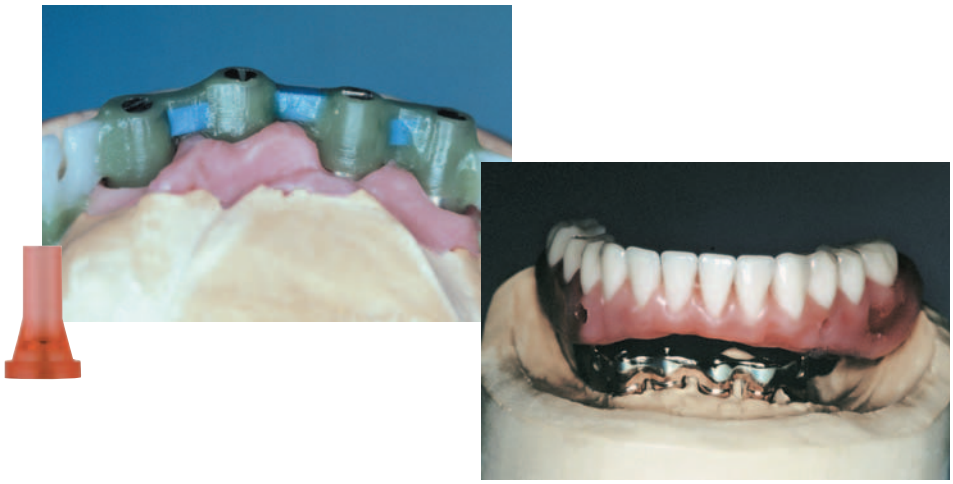


Mandibular overdenture with polymerized FRIADENT bar clips

Overdentures

Fabrication of bar coping and bar assembly

Bar reconstruction on FRIADENT MP abutments can be fabricated using FRIADENT castable waxing sleeves (see page 107) or plastic copings.



Laboratory case study: H. Eisenmann; Amstetten, Germany

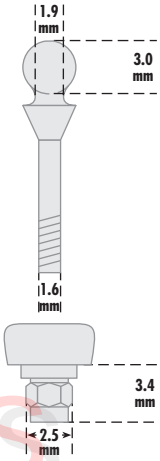
Function

The alternative fabrication of overdentures at gingival level with the FRIADENT MP analog is described on page 144.

The FRIADENT Ball and Socket attachment – Fixed quickly and securely

The adjustable FRIADENT Ball and Socket attachment offers the option of quick and economical stabilization of mandibular overdentures with excellent hygiene access. Implant divergences of up to 15° can be compensated for by rotating the socket on the ball.

The insert and the ball screw form the male section of the FRIADENT attachment. The insert is available in gingival heights of 1, 2, 3 and 5 mm. The insert is color-coded at the hex and flares slightly from the implant diameter.
The central hole of the insert has a 2 mm deep cone as a guide for the attachment screw.
The head diameter of the ball is 3 mm, the diameter of the ball collar is 1.9 mm. The 1.22 mm hex driver is used to tighten the ball screw through the insert into the implant.
The total length of the 1.6 mm diameter thread depends on the gingival height:



Gingival height	GH 1	GH 2	GH 3	GH 5
Total length of screw	11 mm	12 mm	13 mm	15 mm

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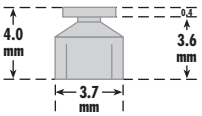
The adjustable socket (gold alloy) has four leaves and ends in an 0.4 mm tall retention groove with three machined indentations for secure attachment to the denture. The external diameter of the socket is 3.7 mm. A blue silicone ring 4.5 mm in diameter and an 0.5 mm flat, white silicone ring around the attachment matrix are lab spacers.



During restoration of an edentulous mandible with the FRIADENT Ball and Socket attachment, the insert is seated in the implant with the seating instrument and fastened with the attachment ball screw. The implant diameter and the gingival margin of the insert must be adapted to the soft tissue situation. The socket is polymerized into the denture base.
This is done either in the laboratory during denture processing fabrication or directly by the practitioner chairside.
Any axial divergences are compensated by aligning the sockets to a common line of draw.
The simple insertion ensures a restoration that is easy on the patient, even for patients with restricted hygiene access. The rounded shape makes the FRIADENT attachment easy to clean and makes it particularly suitable for patients with problems caused by their age or a dexterity.

Overdentures

Advantages of the FRIADENT attachments

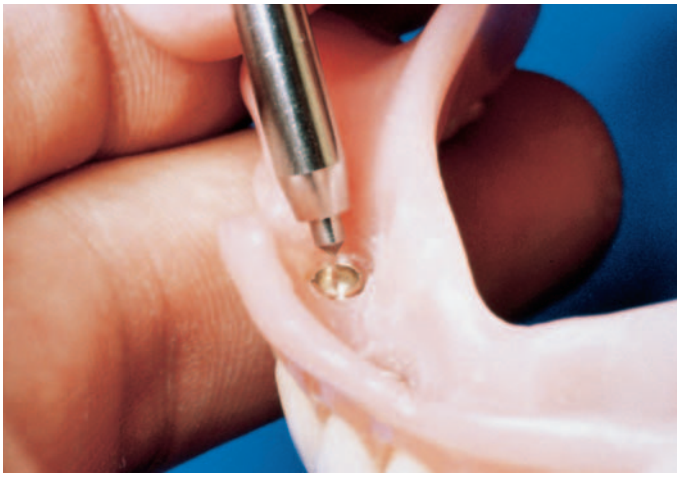
- Simple, quick and economical restoration
- Direct and indirect procedures possible
- Optimum hygiene access
- Compensates axial divergences of up to 15°
- Color-coding by diameter
- Secure tightening with the torque-limited 1.22 mm hex driver
- Blue silicone ring for stabilizing the location of the socket during polymerization
- White silicone ring as spacer between matrix and denture plastic
- Adjustable socket retention due to FRIADENT activator or deactivator

Insert seated in the implant analog, ball screw and socket in position with blue and white spacers

Socket polymerized in mandibular overdenture (spacers removed after processing)

FRIADENT socket activator and deactivator – Customized retention

The deactivator has a cone as a working tip to expand and, therefore, decrease the retention.
However, the activator has a narrower tip that when pushed into the center of the socket collapses the leaves and increases the retention.



Customized setting of retention using the FRIADENT socket activator

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Overdentures

The FRIADENT telescopic abutment – Prefabricated titanium technology

The FRIADENT telescopic abutment can be utilized to support overdentures. Milling the FRIADENT titanium telescopic abutment allows primary components to be prepared without casting.

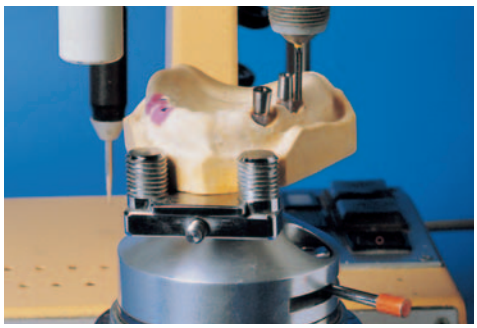
The FRIADENT telescopic abutment is a standardized solid abutment of pure titanium with a height of 8 mm from the implant abutment interface.
The FRIADENT telescopic abutment flares 1 mm wider than the top of the implant and then has a 7 mm conical section.

The dimensions are as follows:

Implant diameter	D 3.4	D 3.8	D 4.5	D 5.5	D 6.5
Maximum expansion	5 mm	5.5 mm	6 mm	7 mm	8 mm

The central internal hole for fastening with the FRIADENT abutment screw has a 2.4 mm thread at its upper edge for the seating instrument.
There is a circular groove for locating the FRIADENT Hermetics on the underside of the 4.5 to 6.5 mm diameter abutments.

The FRIADENT telescopic abutment forms the base for telescopic or conical crowns and is prepared by milling. The flare's conical shape allows correction of larger axial divergences. The FRIADENT milling analog is recommended when milling techniques are used (see page 89).



FRIADENT telescopic abutments are custom-prepared in the milling machine

Advantages of FRIADENT telescopic abutment

- Casting not required to fabricate the abutment
- Simple, economical restoration
- Conical shape supplies bulk to correct axial divergences of the implants
- Good hygiene access
- One abutment per diameter
- Customized preparation by dental technician

Milled FRIADENT telescopic abutments

DropBooks

Polymerized copings in a maxillary overdenture

Overdentures

The FRIADENT AuroBase – Custom contouring from the implant interface

The FRIADENT AuroBase can also be used to fabricate customized abutments for telescopic restorations. This is done with a cast-to technique. The FRIADENT AuroBase simplifies dental procedures, particularly with severe angles or restricted spaces.

The prefabricated cast-to HSL base is manufactured of a high-quality precious metal alloy (high melting point). It has an 0.6 mm gingival collar and a color-coded waxing sleeve. The waxing sleeve has an 0.6 mm wall thickness. AuroBase abutments are available for implant diameters of 3.4 to 6.5 mm. The 4.5 to 6.5 mm diameter have a groove on the underside of the abutment for the Hermetics ring.

The FRIADENT AuroBase can be adapted to all possible situations to set up a primary component by shortening it and by customized waxing of the primary component. Any alloy of similar TEC value can be used with the cast-to technique and primary and secondary components can be fabricated from the same alloy. Calibrated friction values ensure long-term functioning of the prosthetic restoration.

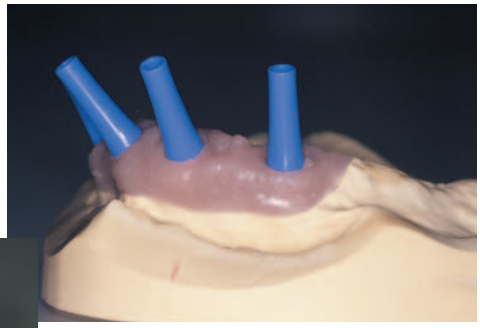
The FRIADENT AuroBase can be customized by shortening and waxing to the sleeve. The abutment is then cast-to. The casting alloy must have a minimum casting temperature of 1450° C (2642° F).

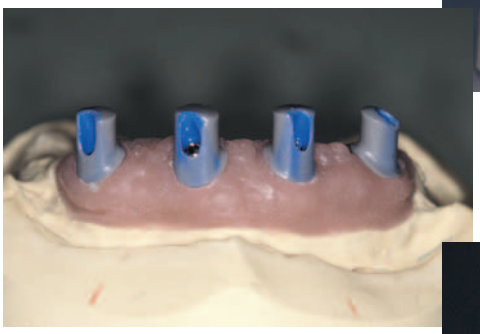
Advantages of FRIADENT AuroBase

- **Customized fabrication of abutment for telescopic restorations**
- **Optimum control of the margin and soft tissue contours**
- **Compensation for axial divergences**
- **Maximum fitting accuracy with CNC-milled gold cylinder**
- **Easy identification through FRIADENT color-coding**

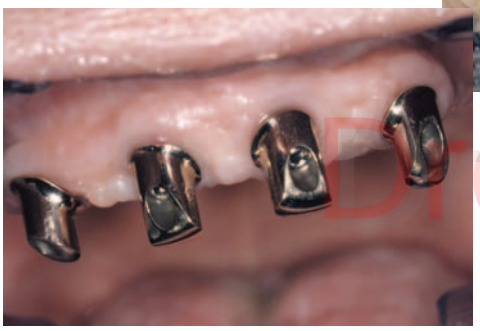
Customized fabrication of abutments with FRIADENT AuroBase

AuroBase abutments on the master cast with severe divergence





Waxed AuroBase copings

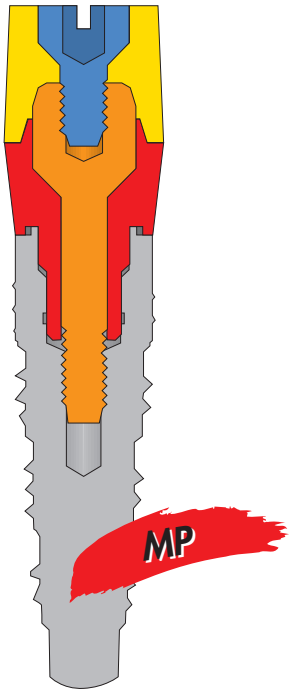


AuroBase abutments fixed in the milling base and in situ

DropBooks

Function

Alternative prosthetics at the gingival level with the FRIADENT MP abutment are described on page 144.



The FRIADENT MP (Multi-Purpose) abutment – Multiple implant restorations made easy

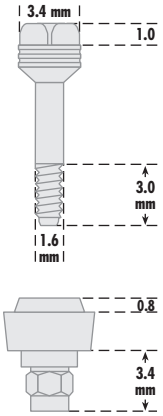
The FRIADENT MP abutment is used for fabricating the occlusally screw-retained bridge or bar constructions for restoration of multiple implants. All steps are carried out at the gingival level. Allowances for axial divergence in the implants can, therefore, be made. The dentist selects the FRIADENT MP abutment chairside. The technician selects the matching prosthetic components on the master cast.

The FRIADENT MP abutment is composed of the MP insert and the matching insert screw. The MP insert has the well-known FRIADENT color-coding in the region of the implant-abutment connection and is available for diameters of 3.4 to 6.5 mm.
The FRIADENT MP inserts flare from the top of the implant (see table). There is an 0.8 mm cone on top of the insert, which holds the head of the seated MP insert screw and provides lateral stability for the framework.

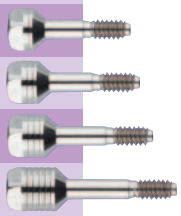
Implant diameter insert	Prosthetic diameter insert
D 3.4	4.8
D 3.8	4.8
D 4.5	5.2
D 5.5	5.9
D 6.5	6.9

The titanium MP inserts have a central hole with a conical expansion for seating the MP insert screw. A 1.8 mm thread is tapped in the region with parallel walls for the seating instrument. The MP insert can thus be delivered easily and securely.

The FRIADENT MP insert screw with 1.6 mm threads extending over 3.0 mm has a head diameter of 3.4 mm. There is a matching insert screw for each gingival height (see table) identified by grooves in the screw head.



Gingival height	Screw length	Marker rings
GH 1	10 mm	1
GH 2	11 mm	2
GH 3	12 mm	3
GH 5	14 mm	5



On the round head of the MP insert there is a 1 mm high external square for a 2.6 mm driver. The external square has a 1.6 mm thread for an MP screw to fix bridges or bars.
The MP insert screw is tightened with the seating instrument for MP insert screw with the ratchet or contra-angle handpiece.

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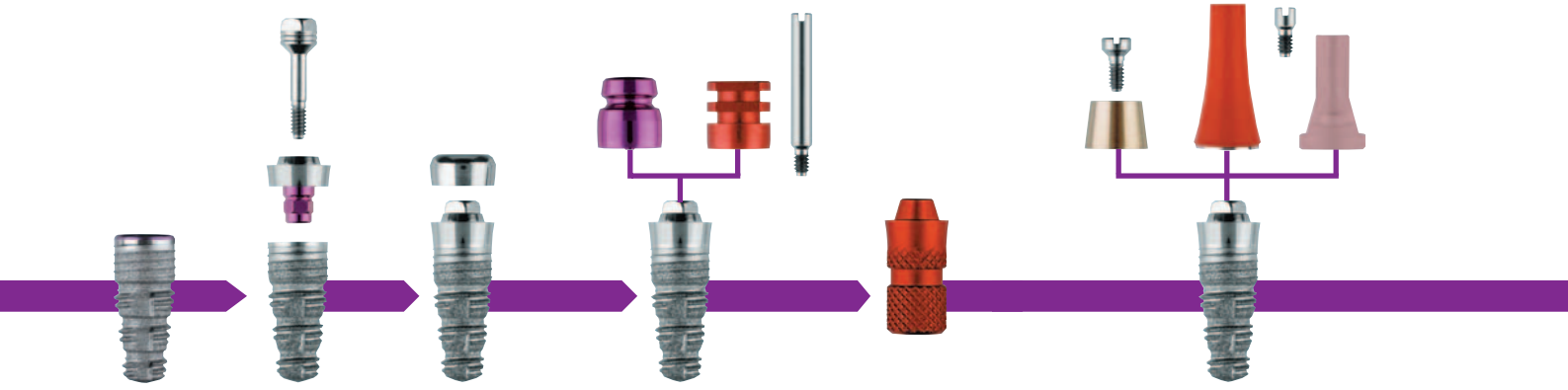


MP insert + MP insert screw

MP cover screw

MP impression coping or MP PickUp impression coping

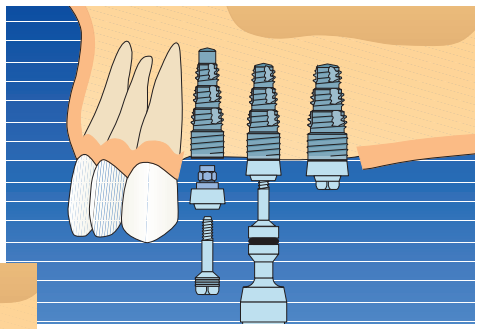
MP analog

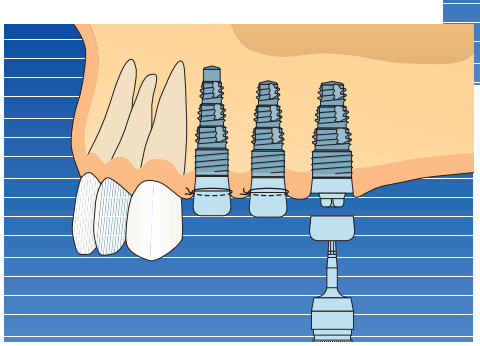
Bar coping with MP coping screw or cast-to and castable waxing sleeve with MP prosthetic screw

Function

Fabricating a bridge at the gingival level on MP abutments

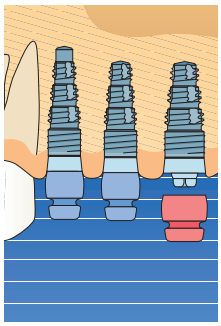
Uncovery and delivery of the FRIADENT MP inserts

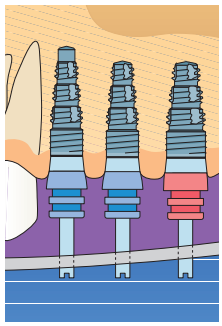


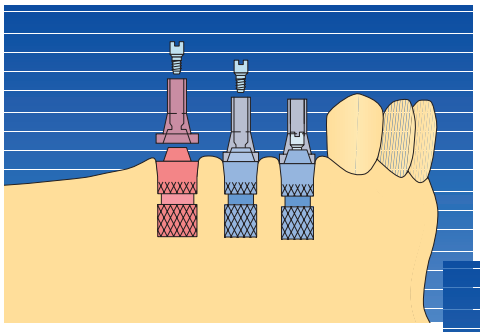


Suturing around the FRIADENT MP inserts and cover screws to sculpt the peri-implant soft tissue

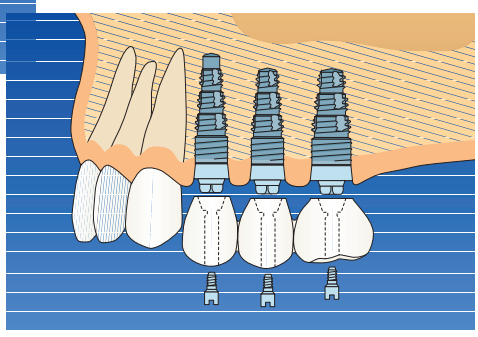
Impression with MP transfer impression coping or PickUp at the level of the FRIADENT MP abutment







FRIADENT MP analogs in the master cast with castable waxing sleeves and MP prosthetic screws



Prosthetic delivery of the final restoration and securing the MP abutment with the FRIADENT MP screw

The FRIADENT MP abutment can be protected with the MP cover screw during soft tissue healing until delivery of the final restoration. The cover screw is manufactured of machine-polished titanium and has rounded edges. The diameter matches the prosthetic diameter of the FRIADENT MP abutment and is color-coded on the inside for identification. The cover screw has a central thread shaft matching the threads of the FRIADENT MP insert screw. The internal geometry of the cover screw matches the MP insert and fits it precisely. The cover screw has an 0.9 mm internal hex for placement with the respective handpiece or contra-angle driver. The 0.9 mm hex driver is used to place and remove the MP cover screw from the abutment.

The FRIADENT MP abutment is suitable for various healing modes

1. When a two-stage procedure is used, once the healing phase is complete and the osseointegrated implants have been uncovered, the implant screws are removed and immediately replaced with FRIADENT MP abutments. The gingival margin of the FRIADENT MP abutments is selected based on the soft tissue thickness. FRIADENT MP cover screws are then threaded onto the abutment.

2. In addition to the classical covered implant healing, the FRIADENT MP insert with the MP abutment screw can also be delivered at implant placement. A second surgical procedure to uncover the implants is not required.

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Function

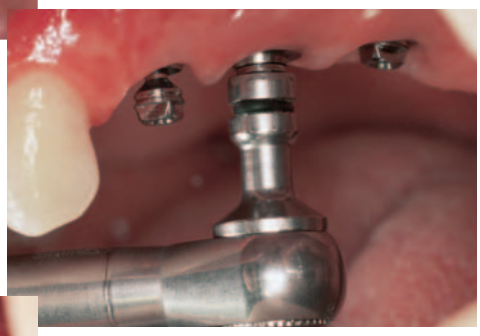
Advantages of the FRIADENT MP abutment

- Does not require repeated removal of subgingival components
- Simplifies prosthetic stages, such as impressions and framework try-ins
- Reduces the number of required components
- Precise integration of abutment components

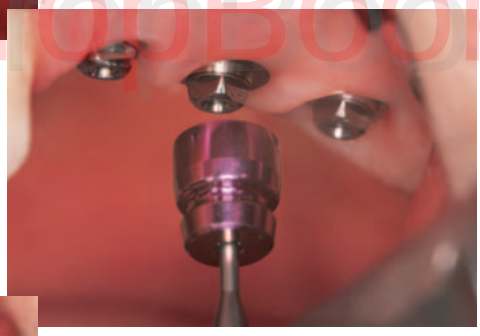
FRIADENT MP abutment with prefabricated components for bridge and bar constructions

Supragingival procedure with FRIADENT MP abutment and insert screw

Inserting the MP insert with seating instrument for MP insert



Fastening the MP insert screw with the seating instrument for insert screw and ratchet



Transfer impression with MP transfer impression coping

Delivering the MP cover screw

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MP transfer technique

Impression at gingival level

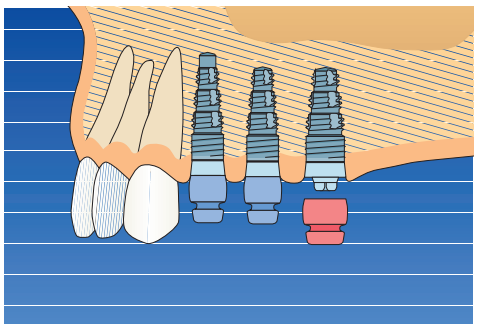
Exact transfer of the clinical situation to the master cast is essential for passive, precise seating of the prosthesis.
The concept of the FRIADENT MP abutment includes making impressions at the **gingival level** without removing the abutment.

The impression can be
- made by the **MP transfer technique** (closed-tray) or
- the **MP PickUp technique (open-tray technique)**.

FRIADENT MP transfer impression coping

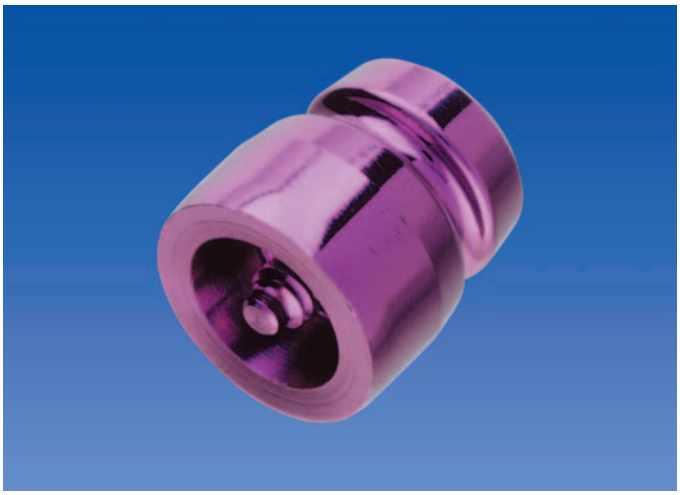
Color-coded FRIADENT MP transfer impression copings (for diameter 3.4 to 6.5 mm implants) are available for making precise impressions at the gingival level over the inserted MP abutments. A central thread shaft locks in the threads of the FRIADENT MP insert screw. The internal geometry of the FRIADENT transfer coping matches the MP insert precisely.

The 6.5 mm tall FRIADENT MP transfer impression coping has a circular retention groove to anchor it securely in the impression and is delivered with the 0.9 mm hex driver.
The impression is made with the FRIADENT MP transfer impression coping after removal of the MP cover screw, but without removing the MP insert or the MP insert screw. The FRIADENT MP transfer impression coping is mounted directly onto the MP screw with the 0.9 mm hex driver and unscrewed from the MP abutments again after the impression has been made. The MP transfer copings are then mounted on MP analogs and reseated into the impression. The impression can then be poured. The MP abutments are covered with the FRIADENT MP cover screws until the final prosthesis is delivered.



Advantages of the FRIADENT MP transfer impression coping

- Precise impressions at the abutment level
- Simple, transfer technique
- Quick, secure impression technique



FRIADENT MP transfer impression coping

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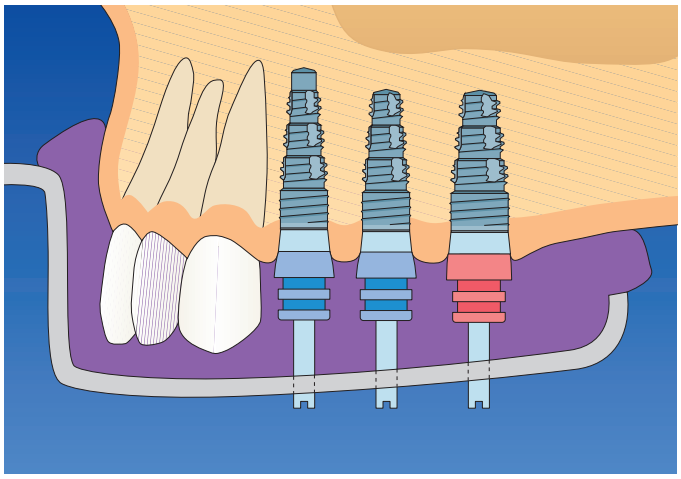
MP PickUp technique

The FRIADENT MP PickUp impression coping

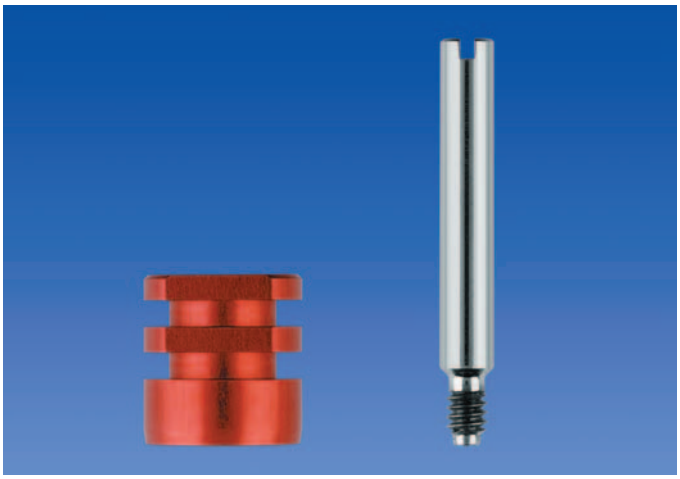
Color-coded FRIADENT MP PickUp impression copings for a PickUp or open-tray technique are available for implant diameters 3.4 to 6.5 mm. The 6.5 mm tall FRIADENT MP PickUp impression coping is rotationally symmetrical in their lower third. The upper two-thirds are flattened on two opposite sides and have two circular retention grooves for secure retention in the impression. The MP PickUp impression coping is mounted on the MP abutment with the 16 mm long MP PickUp guide pin (2.1 mm head diameter and 1.6 mm thread thickness) utilizing the 1.22 mm hex driver. The head of the MP PickUp guide pin projects 9 mm above the MP PickUp impression coping.

The impression with the FRIADENT MP PickUp impression coping is made supragingivally with a custom tray, which is perforated for the MP PickUp guide pins (open-tray technique). MP Insert and insert screw remain in the implant. After removal of the FRIADENT MP cover screw, the FRIADENT MP PickUp impression coping is mounted on the MP abutment with the MP PickUp guide pin. After the impression material has set, the MP PickUp guide pin is loosened, then the impression tray is removed from the patient's mouth. The MP PickUp impression coping remains in the impression. The MP abutments are covered with the FRIADENT MP cover screws again until the prosthesis is delivered.



Advantages of the FRIADENT MP PickUp impression coping

- Precise impressions
- Transfer of the MP PickUp impression coping to the impression is not necessary
- Quick, secure impression technique



FRIADENT MP PickUp impression coping with MP PickUp guide pin

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MP Analog

The precise replica: model fabrication after making impressions at the gingival level

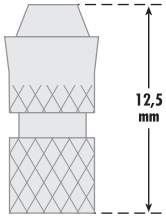
Depending on the impression technique used, the laboratory receives:

- The associated FRIADENT MP transfer impression copings and impression or
- The impression containing the FRIADENT MP PickUp impression copings with the MP PickUp guide pins.

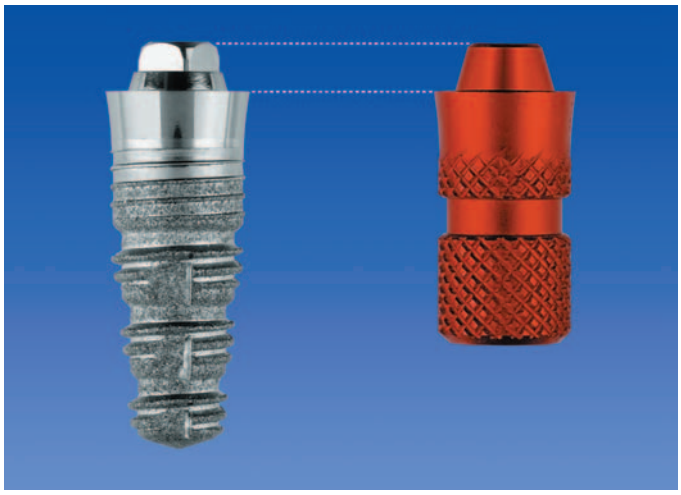
FRIADENT MP analogs – Reproduction of the abutment at the gingival level

FRIADENT MP analogs are used for exact reproduction and location of the inserted MP abutments.

The aluminium FRIADENT MP analogs for implant diameters 3.4 to 6.5 mm perfectly match in their geometry to the MP abutment in the patients' mouth. The top of the FRIADENT MP abutment in the patient's mouth matches the top of the FRIADENT MP analog in the master cast and is color-coded by diameter. The laboratory analog is securely anchored in the master cast by a roughened surface and a circular retention groove. The length of the MP analog is 12.5 mm, regardless of the diameter.



FRIADENT MP analogs are anchored in the master cast and exactly reproduce the location of the MP abutments.
They are used as the basis for fabrication of the framework. The matching prosthetic components such as bars or waxing sleeves are selected on the cast.

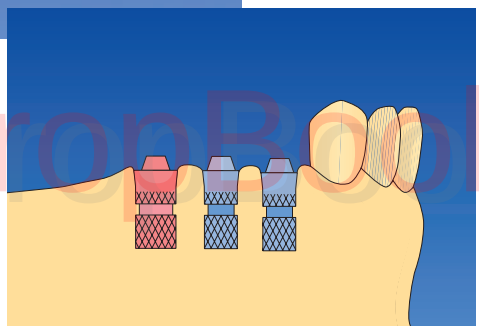


The implant-abutment connection of the FRIADENT MP analog matches the clinical FRIADENT MP insert

Advantages of FRIADENT MP analogs

- Exact reproduction of the MP abutment
- Color-coded by diameter
- Simple fabrication of the prosthetic reconstruction at gingival level

FRIADENT MP analogs
D 3.4 – D 6.5



Reproduction of FRIADENT MP abutments on the master cast

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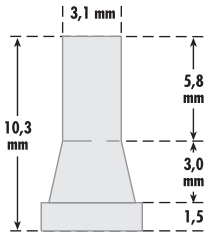
Fabrication of bridges on FRIADENT MP abutments

The exact transfer to the master cast is the basis for fabricating a precise, passive-fit framework.
The dentist selects and delivers the FRIADENT MP abutments.
The technician only needs to select the:

- **Castable** waxing sleeves or
- **Cast-to** waxing sleeves

The FRIADENT castable waxing sleeve

see page 107



The FRIADENT castable waxing sleeve provides a base for fabricating occlusally screw-retained bridges in combination with FRIADENT MP abutments.

The FRIADENT waxing sleeve, manufactured of polymethylmetacrylate (PMMA), has a total length of 10.3 mm and is color-coded to match the implant diameter.
It fits the MP insert precisely and matches the diameter of the MP abutment to a height of 1.5 mm. The waxing sleeve narrows conically to the diameter of the screw shaft of approximately 3.1 mm over a distance of approximately 3 mm. A rotationally symmetrical cavity on the bottom of the waxing sleeve is left for seating on the FRIADENT MP abutment. The 5 mm long FRIADENT MP screw for waxing sleeve has a 2 mm long head and has a thread diameter of 1.6 mm. It fastens the waxing sleeve to the FRIADENT MP abutment. The 1.22 mm hex driver is used to tighten the MP prosthetic screw.
The FRIADENT castable waxing sleeve defines the location of the screw head. The sleeve is shortened as needed and the framework cast.

After casting, the mating surfaces on the waxing sleeve must be cleaned with the FRIADENT finishers (see page 108/141).

Advantages of FRIADENT castable waxing sleeve

- **Prefabricated sleeve for economical fabrication of precisely fitting bridge restorations**
- **Can be used with all alloys**
- **Ensures complete burn-out during the casting process**

The FRIADENT finishers – Precise seating in no time

see page 108

For simple and precise finishing of flat and mating surfaces after casting in the dental laboratory.

FRIADENT finishers are hand instruments manufactured of stainless steel and consist of a 9 cm long handle with a working tip. They have a four-bladed working surface, whose external geometry corresponds to the MP abutment. One instrument each is available for implant diameters 3.4 to 4.5 mm and diameters 5.5. to 6.5 mm, as well as for finishing the screw seat.
The FRIADENT finishers are identified by a laser-etched label on the handle.

The FRIADENT finisher is used for smoothing the conical and mating surfaces after casting. The finisher for the screw head seat smoothes the screw head seat and ensures that the FRIADENT screw for waxing sleeve is completely seated.

Advantages of the FRIADENT finishers

- **Precise and quick finishing of the casting**
- **Superior framework fit**

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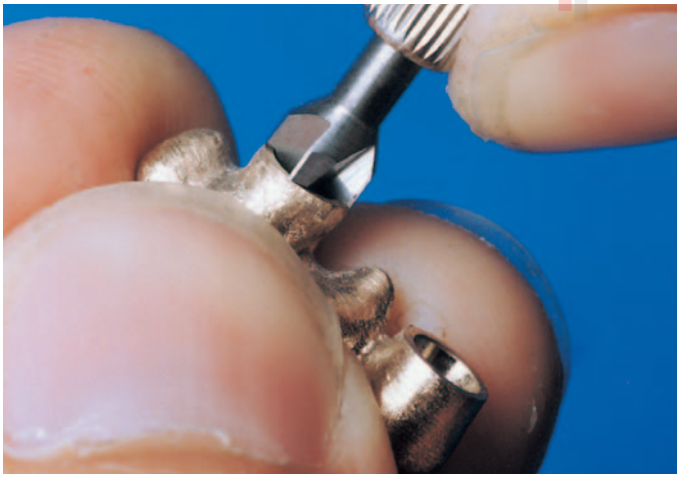
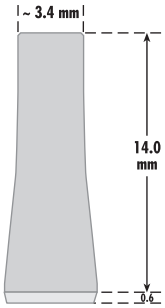


The mating surfaces between the framework and abutment, screw and screw seat are cleaned with the finishers

The FRIADENT cast-to waxing sleeve – Prefabricated precision

see page 109

The FRIADENT cast-to waxing sleeve is used for fabricating occlusally screw-retained bridges in combination with FRIADENT MP abutments. Unlike the castable waxing sleeves, it does not require finishing with the FRIADENT finishers. The abutment connection and screw head seating are set by a precision-machined gold cylinder.



The castable waxing sleeve of POM plastic is molded to cover the gold cylinder. The total length of the waxing sleeve is 14 mm, is color-coded by diameter, and has an 0.6 mm high gingival collar.
Its internal geometry fits the FRIADENT MP abutment precisely. The abutment narrows conically to the final diameter of 3.4 mm. The FRIADENT MP abutment prosthetic screw fastens the cast-to waxing sleeve to the MP analog.

The FRIADENT cast-to waxing sleeve in combination with the MP abutment is used for fabricating occlusally screw-retained bridges. The dental technician shortens the waxing sleeve as required and uses it as the base for the framework wax-up.

Advantages of FRIADENT cast-to waxing sleeve

- **Prefabricated sleeve for fabricating precisely fitting bridges**
- **Defines the location of the screw head**
- **Prefabricated, precision-fit from a machined gold cylinder**
- **The POM waxing sleeve burns out clearly**

The maximum casting temperature for the cast-to waxing sleeve is 1450° C (2642° F).

The FRIADENT SolderSet bridge – Ensuring a passive fit

see page 110

When using soldering techniques, the framework must be firmly fixed in the investment to guarantee a precise soldering procedure. Heat-resistant FRIADENT soldering analogs for bridges can be used regardless of the implant diameter and are invested in the investment model together with the screw-retained and splinted bridges.

The 12 mm long stainless steel FRIADENT bridge soldering analog can be used with all implant diameters. It consists of an MP analog with a retentive base and a soldering screw.

The FRIADENT SolderSet bridge secures the sectioned framework in the investment. Fastening the framework to the analogs with a retaining screw guarantees freely accessible soldering joints and uniform heating. The result is tension-free soldering.

Advantages of the FRIADENT SolderSet bridge

- **Fixed location in the investment model**
- **Good access to soldering joints**
- **Tension-free soldering with uniform heat distribution**

DropBooks

Overdentures

Fabrication of bar constructions on FRIADENT MP abutments

The FRIADENT bar coping is used for fabricating bar constructions to retain overdentures in combination with FRIADENT MP abutments.
Exact transfer of the clinical situation to the precisely fabricated master cast is the basis for fabricating tension-free prosthetic bar reconstruction.
The dentist sets the prosthetic concept for the dental technician by inserting the FRIADENT MP abutments.
The technician only needs to select the components for the **bar-supported prostheses.**

Prefabricated
- **High gold content precious metal bar coping for soldering** and
- **Titanium bar coping for laser-welding**
- **Castable bar coping**

are available for fabrication of bar constructions.

The FRIADENT bar coping – Cast or fixed with solder or laser-welded joints

see page 116

FRIADENT precious metal bar coping is available in castable plastic, high gold content (for soldered connections) or in titanium (for laser-welded connections).
The coping is 4.5 mm high and has a coronal diameter of 4.8 mm.
The implant-abutment connection matches the FRIADENT MP abutment of the same size, making the bar coping appear increasingly conical with increasing implant diameter.
The implant-abutment connection has a rotationally symmetrical recess on the internal surface, allowing it to be seated on the MP abutment without difficulty.
The bar is fastened to the abutment with the FRIADENT MP coping screw.

FRIADENT bar coping is used for splinting implants with bars to retain overdentures. They are fixed in the master cast directly on the MP analog.

Advantages of FRIADENT bar copings

- **Prefabricated, precision-fit to FRIADENT MP abutments**
- **Defined screw head position**
- **Various connection techniques**
- **High-quality precious metal alloy**
- **Alternative application of titanium technology**

FRIADENT round bars – Secure retention due to custom-fit

see page 117

FRIADENT round bars are used to retain overdentures in combination with FRIADENT MP Classic abutments and prefabricated bar copings.

FRIADENT round bars

FRIADENT precious metal or titanium round bars are generally round in cross-section with a diameter of 2 mm. They are available in uniform lengths of 50 mm and can be attached to FRIADENT bar copings by soldering or laser-welding.

FRIADENT bar copings and round bars

The bars are sectioned to fit between the copings. Bar constructions based on precious metal are attached by soldering. FRIADENT bar copings and round bars of titanium are joined by laser-welding. After fabrication, the bar construction is seated on the MP abutments and fixed in place with the FRIADENT bar coping screw. The bar splints the implants and retains the denture.

DropBooks

Overdentures

The FRIADENT SolderSet bar – Preventing tension

see page 118

When using soldering techniques, the framework must be firmly fixed in the investment to guarantee a passive fit of the bar. Heat-resistant FRIADENT soldering analog for bridges can be used regardless of the implant diameter and are invested in the investment model together with the screw-retained and splinted bridges.

The 12 mm long stainless steel FRIADENT bar soldering analog consists of an MP analog with a retentive base and a soldering screw.

The FRIADENT bar SolderSet secures the bar sections in the soldering base. Fastening the framework to the soldering base with a retaining screw guarantees freely accessible soldering joints and uniform heating. The result is tension-free soldering.

Advantages of the FRIADENT SolderSet bar

- **Fixed location in the soldering investment**
- **Good access to soldering joints**
- **Tension-free soldering with uniform heat distribution**

The FRIADENT bar clip – Secure overdenture retention

see page 119

The adjustable FRIADENT bar clips are polymerized into the overdenture, thereby securely retaining the overdenture to the bar construction.

The FRIADENT bar clips are manufactured of a high-quality precious metal alloy. They are available in 50 mm sections and have an omega-shaped profile to match the FRIADENT round bar. They have a retentive section at the top for secure retention to the overdenture. FRIADENT bar clips are adjustable and can be customized for the patient with the FRIADENT bar clip activator.

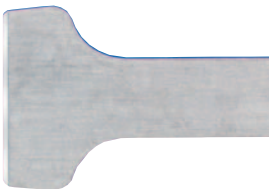
The bar clip activator is composed of three key-shaped instruments with blades of different widths (3, 10 and 15 mm) depending on the length of clip that is to be activated.

The FRIADENT bar clips retain the overdenture to the bar and can be adjusted.

MP

Advantages of FRIADENT bar clips

- Prefabricated, matched and custom-fitted components for retaining overdentures
- Joint function of overdenture by anti-rotational stability design
- Secure denture stabilization in atrophic cases
- Quick and secure fabrication of a bar conctruction
- Can also be used in conventional prosthetics
- Short vertical height



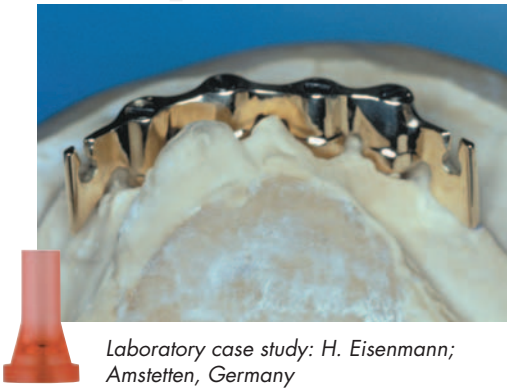
Caution: Do not overactivate the clip (danger of breakage)!

Customized waxing of bar coping and bars

see page 120

DropBooks

Custom-milled bar constructions on FRIADENT MP abutments can be fabricated using FRIADENT castable waxing sleeves (see page 107, 140).



Laboratory case study: H. Eisenmann; Amstetten, Germany

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For their cooperation and for providing illustrative material we would like to thank:
P. Adar, MDT; Atlanta, Georgia, USA
H. Eisenmann, dental technician; Amstetten, Germany
H. Enomoto DDS; Niigata, Japan
Dr. D. A. Garber, DDS, and Dr. M. Salama, DDS; Atlanta, Georgia, USA
Dr. H.-J. Hartmann; Tutzing, Germany
Dr. J. Heldridge; Edmonds, Washington, USA
Dr. J. Neugebauer; Cologne, German

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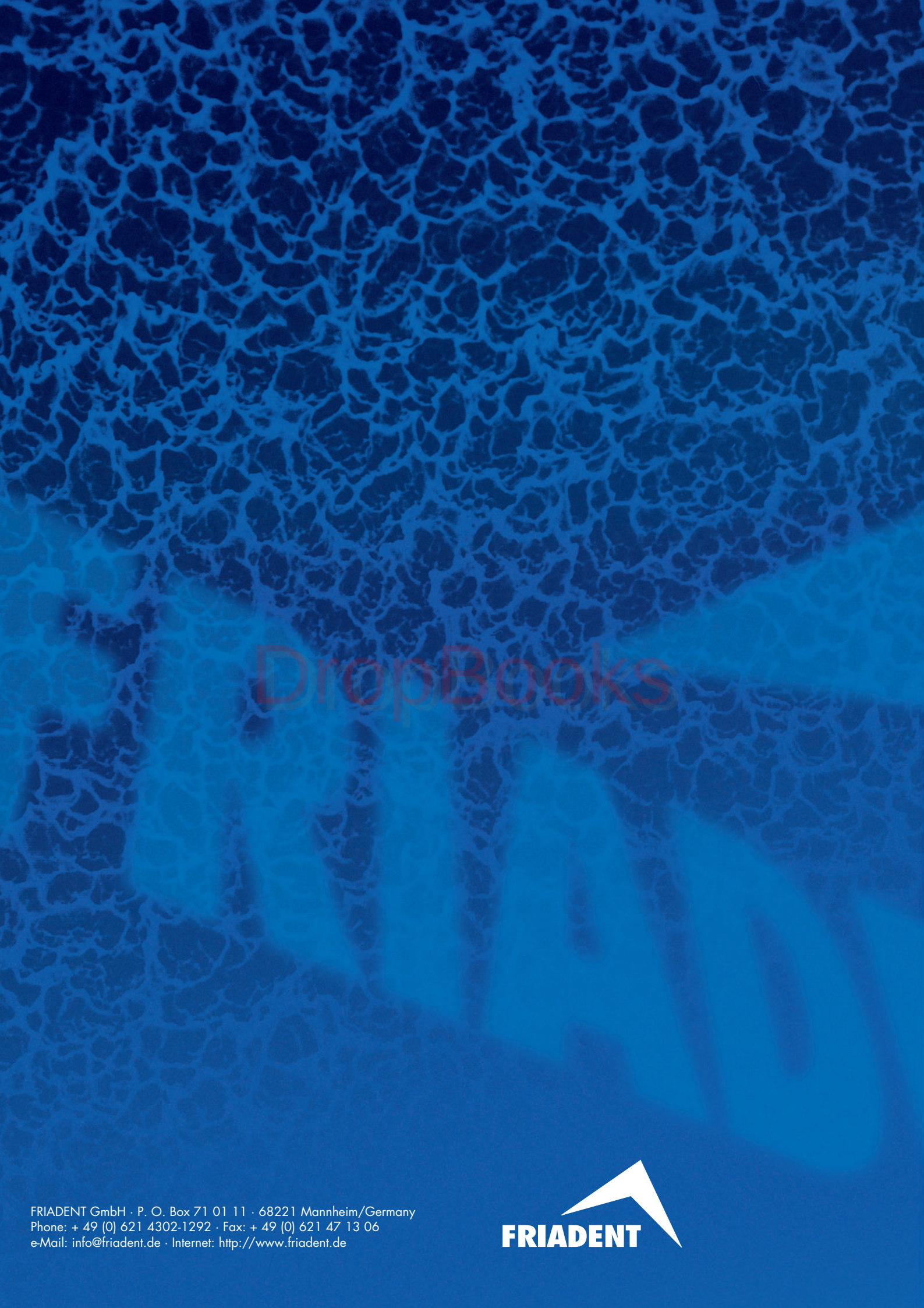

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